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**TRANSITION FROM UNICELLULAR
TO MULTICELLULAR LIFE DISCOVERED?**



JOURNAL OF CREATION

An international journal devoted to the presentation and discussion of technical aspects of the sciences such as geology, biology, astronomy, etc., and also geography, archaeology, biblical history, philosophy, etc., as they relate to the study of biblical creation and Noah's Flood.

COVER: *Anopheles stephensi* mosquito obtaining a blood meal

IMAGE: Centers for Disease Control and Prevention's Public Health Image Library

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Many paths lead to high-altitude adaptation

Jean K. Lightner

One marvellous characteristic of living things is the ability to respond to their environment in a way that sustains life and allows for procreation. This is clear evidence of a wise Creator who blessed living creatures to reproduce and fill the earth (Genesis 1:21–22, 27–28; 8:17; Isaiah 45:18). Of great interest to creation biologists is the underlying design that has enabled living creatures to adapt to numerous, varied environments in a bit over 4,300 years since the Flood.

Using the history in Genesis and observations from the world around us, creation scientists recognize that within various created kinds of plants and animals, considerable diversity has arisen.¹ While it is well known that substantial variation has arisen in domestic species (e.g. dogs) within the last few hundred years, evolutionists imagined that the process is orders of magnitude slower in the wild. Given the biblical timeframe, this is clearly not the case. In recent decades, scientific studies have confirmed many examples of rapid diversification in the wild.² Creation geneticists have begun to explore some of the mechanisms that appear to be involved.³

As more studies uncover the rapid pace of changes and their underlying mechanisms, it becomes increasingly apparent that God designed His creatures with an amazing ability to adapt to a wide variety of challenges that He knew they would encounter in this world. A brief glimpse of this can be seen in organisms that have adapted to living at high altitudes.

Taking the high road

It is well known that high-altitude environments pose serious challenges

because of reduced (partial pressure of) oxygen and generally cooler temperatures. For warm-blooded animals, mammals and birds, this can impair not only normal activity, but also the maintenance of a constant body temperature. Indeed, ascending to very high altitudes too rapidly can cause severe sickness or death (acute mountain sickness).⁴

Yet God, in his providence, has designed our bodies, and those of other creatures, with the inherent ability to adapt. Most people can travel by plane to cities well over a kilometre above sea level (e.g. Quito, Ecuador, 2,850 m; Bamyan, Afghanistan, 2,550 m; Mexico City, 2,250 m; Santa Fe, NM, 2,194 m), and with proper precautions (e.g. avoiding heavy exertion for the first few days and increasing fluid intake) can remain healthy and adjust well. Here the underlying adaptive changes are epigenetic, involving changes in gene expression that allow our bodies to adjust to environmental challenges, including high altitudes. This is known as *physiologic adaptation*.

Physiologic adaptation to high altitude is not a matter of making a single adjustment. Instead, multiple, complex, well-coordinated changes in gene expression result when the body detects the drop in oxygen. The obvious immediate changes are an increase in respiratory and heart rate. Yet these cannot be maintained for extended periods, so this is followed by other changes which are more sustainable. Some of these changes have been studied in detail.⁴

Another immediate change to the reduced oxygen at high altitudes is an increase in hypoxia-inducible factors (HIFs), transcription factors regulating a variety of genes involved in the response. One of the genes upregulated by HIFs is the erythropoietin (EPO) gene. Within a day or two, EPO levels peak. Among the functions of EPO is stimulating erythropoiesis, or the production of red blood cells. Within a few weeks, there is a substantial

increase in circulating red blood cells to help deliver sufficient oxygen to the tissues.⁴

Adaptive physiological changes are even more dramatic in young animals that develop under high-altitude conditions. Studies in beagles showed that adaptive development in the lungs and associated vasculature increased diffusion, resulting in greater adaptation than seen in adults. This is from altered gene expression during development, which is also epigenetic in nature (i.e. gene sequence is not changed to accomplish this). In some cases, epigenetic changes can be heritable, or passed on to offspring. It is currently unknown if this may also play a role in high-altitude adaptation.⁴

Yet God's provision does not stop with physiologic adaptation as described above. In populations of people and animals that have lived at high altitudes for many generations, adaptive genetic changes have also been documented.

Parallel paths with divergent steps

There are interesting patterns that may be seen with *genetic adaptation*; often the same genes are involved in multiple, independent adaptations to a specific environment.⁵ This is true in birds that have adapted to high altitudes. One study compared 28 high-altitude adapted avian species with their nearest lowland relatives. In most cases there were nonsynonymous mutations (i.e. those causing an amino change) affecting one of the several hemoglobin subunits which resulted in a higher oxygen affinity, corresponding to an adaptive phenotype.⁶ The question is: is the same mutation occurring repeatedly, or are different mutations in hemoglobin genes responsible for the same adaptive phenotype in these species that independently colonized high-altitude environments?

In most cases different amino acid changes in hemoglobin were

responsible for this adaptive phenotype. This indicates that different mutations were responsible, and a variety of changes in the hemoglobin gene can lead to an adaptive result. So, a parallel adaptive path (increasing oxygen affinity of hemoglobin through mutation in hemoglobin genes) usually had different molecular steps. How amazing that the design of hemoglobin allows for these adaptive possibilities! Certainly designed mechanisms must also be in place for them to arise in a timely fashion (i.e. over a limited number of generations, within hundreds or thousands of years)!

The study revealed a few cases where the same amino acid change was responsible for the increased oxygen affinity of hemoglobin. The most notable was among hummingbirds and one passerine species where a substitution to the amino acid serine (N83S in the β^A -globin subunit) resulted in the increased affinity of hemoglobin to oxygen. The authors were suspicious that the genetic background would influence the effectiveness of a particular amino acid change. Through site-directed mutagenesis this mutation was produced on other genetic backgrounds, and it did not result in the same adaptive change in oxygen affinity. Thus, at least in some cases, a change that is effective in one lineage of organisms may not be in another.⁶

It should be noted that evolutionists usually consider the same mutation in different species as very strong evidence of common descent. This is because they assume the underlying mutations are random and in no way *designed* to occur in a manner that is biased to be adaptive. However, parallel changes have been increasingly documented, making it clear that mutations are not always random. This erodes arguments for universal common descent.⁷ Many mutations are clearly biased, and it would appear that this is often in a way that promotes genetic adaptation.⁸

Different paths to adaptation

The same gene is not always used in adaptation. Human populations that are adapted to high altitudes have mutations in different genes that allow them to thrive under these hypoxic conditions. For example, in Tibetans, three genes (EGLN1, PHD2, and EPAS1) that are part of the pathways used to adapt physiologically (EGLN1 affects HIF levels, PHD2 codes for part of a HIF molecule, and EPAS1 affects erythropoiesis), were found to have an altered sequence.⁴ Yet, different genes appeared to play a prominent role in the genetic adaptation of Ethiopian highlanders and Andeans.

It is important to recognize that such adaptations aren't always due to one or a few genes with a major impact on the affected physiological pathway. Instead, many genes may be involved, which all contribute a little to the adaptation. Many genes with little effects are hard to identify, but continued studies in humans have now recognized over 1,000 genes that appear to be involved to some extent. Further analysis showed that 64 of these genes had undergone changes in at least two of the three high-altitude human populations (i.e. Tibetans, Ethiopians, and Andeans). Interestingly, well over a hundred of the genes implicated in high altitude adaptation are involved in the same biological processes: the circulatory system, angiogenesis, and erythrocyte homeostasis/oxygen transport.⁹ This is clear evidence of design that allows for different genes in relevant pathways to be modifiable, facilitating genetic adaptation.

Summary

The ability of living things to adapt to challenging environments, such as the hypoxic conditions at high altitudes, is truly awe-inspiring. These adaptive changes require the existence of complex, well-integrated pathways to control all of the essential functions of life. Yet, this is not a

rigid complexity, but one that allows for changes that are useful, both physiologically and genetically. This staggeringly complex design of life clearly points to a wise Creator, who through wisdom and foreknowledge, created life to fill the earth.

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Darwin's Point

Jerry Bergman

Darwin's Point, also known as 'Darwin's Tubercle' or 'Darwin's Bump', is a very small outer ear trait used by Darwin in an attempt to prove evolution. It consists of a slightly pointed thickening of the cartilage on the posterior helix at the junction of the upper and middle thirds of the external ear lobe called the auricle (figure 1).¹ It is often called 'Darwin's Point' because the idea was first published by Charles Darwin in *The Descent of Man* as a vestigial feature that he attempted to use as evidence of our common ancestry from primates including baboons and macaques that have a point on the apex of their ears (figure 2).²

In his 1871 book on human evolution, Darwin wrote about "a little blunt point, projecting from the inwardly folded margin, or helix" which is the outer ridge of the ear lobe.³ Darwin invested a full page and a half on this topic, as well as one of the few illustrations in the 1879 edition of his book.⁴ He commented that some readers might conclude that this "trifling" trait is not worth our notice,

but responded to this claim with: "Every character, however slight, must be the result of some definite cause", adding that the trait was produced by "... the extreme margin of the ear folded inwards In many monkeys, which do not stand high in the order, as baboons and some species of macacus, the upper portion of the ear is slightly pointed, and ... if the margin were to be thus folded, a slight point would necessarily project inwards [towards the centre] ... and we may safely conclude that it is a ... vestige of formerly pointed ears—which occasionally reappears in man."⁵

Darwin claimed he learned about it from the 'celebrated sculptor' Thomas Woolner who first described the small disturbance on the ear auricle, and even depicted it in one of his sculptures.^{3,6} Woolner also claimed in his correspondence to Darwin that a 6-month-old human fetus ear often has a Darwin's Point and also resembles that of a monkey, a claim that is untrue.⁷ Woolner theorized that this small protuberance was an atavistic throwback linking humans and primates to their common ancestor. It is sometimes called the Darwin-Woolner Point for this reason. Millard and Pickard even concluded that the trait should be named 'Woolner's Tubercle' instead of Darwin's Point.⁸ It is of interest

that Woolner painted a well-known portrait of Darwin, indicating their close personal relationship.

Considered an important evidence of evolution

This Darwin's Point feature is considered so important by some evolutionists today that *New Scientist's* list of the top five human vestiges has it as number three.⁹ Robbie Gonzalez lists it as number six on his list "10 vestigial traits you didn't know you had".¹⁰ Another website titled "All you need is biology" lists it as second in importance to prove Darwinism.¹¹ An anonymous blogger, a former young earth creationist and now an atheist, on his website "Leaving Christianity and embracing skepticism" wrote: "Darwin's tubercle demonstrates our common ancestry with other primates, which have significantly more prominent pointed ears, possibly to help funnel sound into the auditory canal." He added:

"It's both startling and fascinating to realize that I carry tangible, visible evidence for evolution with me wherever I go. And by no means is this connection to the past something to be ashamed of. On the contrary, to bear such tokens of our history just serves as a reminder of how far our species has come."¹²

Illinois State University anthropologist Martin Nickels presented Darwin's Tubercle among his "Twelve lines of evidence for the evolution of humans & other primates".¹³ Last, Rubicondior on "The blog religious frauds tell lies about" wrote:

"I'm not one to boast, but I have primitive ears. I have the sort of ears of which my remote ancestors might have been proud ... I have Darwin's Tubercles and I can wiggle my ears without wrinkling my forehead. Both these things are vestigial fossils of my remote ancestry."¹⁴



Figure 1. Comparison of a human ear and a macaque ear showing 'Darwin's Point'

Image: Luis Fernández García/CC BY-SA 3.0



Figure 2. An alleged orangutan fetus featuring a pointed ear (from Darwin,¹⁶ figure 3)

In spite of these many confident statements about the validity of Darwin's Point, as early as 1871 German Professor Ludwig Meyer published his doubts about this interpretation for reasons that included its great variability of size, shape, and location in humans, which precludes Darwin's claims.¹⁵

Major problems with the theory

One major problem is that our putative closest ancestors, the chimps and most other higher apes, lack a pointed ear as well as a Darwin's Point. The rare primates with a pointed ear include macaques and yellow baboons. The literature lacks either descriptions or images that document a chimp ear with a trait like Darwin's Tubercle. Neither do gorillas, orangutans, gibbons, nor dwarf chimps called bonobos have pointed ears. Darwin's crude drawing¹⁶ shows an alleged orangutan foetus featuring a pointed ear very unlike that of adult apes, a claim that is not supported by photographs of an orangutan foetus.¹⁷ Darwin considered this an example of evolutionary ontogenetic recapitulation.

A major problem for the atavistic theory is that the Darwin's Point trait is influenced less by genetics, or not at all, than it is by early developmental contingencies in the womb. Professor McDonald concluded that "family and twin studies strongly indicate that Darwin's Tubercle is not determined

by a single gene with two alleles, and there may be very little genetic influence on the trait."¹⁸ One German study of 58 pairs of identical twins found 26 pairs (45%) in which one twin possessed a Darwin's Tubercle on one or both ears, and the other twin totally lacked the trait.¹⁹ For this reason, McDonald stresses that one "should not use Darwin's Tubercle to demonstrate basic genetics".¹⁸ The trait can be bilateral, present on both ear auricles, or asymmetrical, present on one ear only.

Another major problem identifying the trait is that it varies so greatly in both size and shape that it is difficult to divide ear auricles into the two categories, with or without Darwin's Tubercle. It varies from a very prominent bump to close to a small unmeasurable enlargement. Sometimes it can be large enough to cause social problems, such as its peers mockingly calling the child with the trait Pixie ear, Spock ear, or Vulcan ear. In such cases, it is often easily cosmetically removed.²⁰ Darwin also noticed the size problem, saying that the tubercle is variable in size and also somewhat in position.^{3,21}

Darwin's Point can also protrude toward the auditory canal, away from it, or even in the middle of these two extremes.¹ Its presence also varies widely in the world's population. For example, in the few small studies completed it has been confirmed to exist in only about 10.5% of the Spanish adult population, 40% of Indian adults, and 58% of Swedish school children.²² Much larger studies in different populations are required to make any definite conclusions regarding its presence in various populations. As a whole, on average it exists in about 10% of the human population, a rate that depends greatly on the specific size and position criteria used to define it.

Another reason for its significance is that in both criminology and modern human evolution theory the presence of Darwin's Point has historically

been associated with criminality as part of the atavistic theory of crime causation.²³ This theory, called anthropological criminology, essentially taught that the tendency to commit crimes was inherited, and someone who is 'born criminal' could often be identified by physical (congenital) defects. These claimed primitive physical traits, such as Darwin's Point, are part of the now disproved theory that a person is an 'atavistic criminal, 'a throwback' to a more savage stage of human evolution.²⁴

The exact developmental factors producing Darwin's Point during the ear's embryogenesis are unknown but it is believed to form as a result of unequal turning inward of the helix in the foetus. In other words, it is a harmless congenital quirk that results from a slight malformation caused by ear folding occurring during early development. If this conclusion is correct, environmental contingencies, not genetics, would play a central role in the formation of Darwin's Point.²⁵ This despite the fact that a Darwin's Tubercle was once speculated to be due to an incompletely penetrant autosomal dominant because those who possess the alleged allele often do not have the trait. Thus, little evidence exists for the genetic view.²⁶ If genetics plays little or no role in its formation, Darwin's Point could not be either a vestigial organ or an atavism.

Summary

Darwin's Point could not be either a vestigial structure or an atavism because, although all biological traits are influenced in some way by genetics, the environment and other non-genetic factors are critically important for its existence and specific physical form. Furthermore, Darwin's Point identification is problematic because it is so variable in size and location that it could be located in almost any position on the general area where Darwin identified it, even

if it was barely identifiable on the ear auricle helix.

The only reason it was proposed to be some kind of ‘genetic throwback’ was due to the evolutionary assumption that humans evolved from some type of primate.²⁷ A big problem right up front is that very few primate kinds have a decisive point on the upper part of their ear. To support the Darwinian proposal of its origin requires at a minimum genetic evidence consistent with the notion. The only plausible explanation for Darwin’s Point is that it is caused by a harmless congenital/developmental quirk. This view is supported by the finding that it is a relatively rare trait and that the few studies done so far have failed to provide genetic evidence consistent with the Darwinian explanation.

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A case for rapid formation of calcareous concretions

Michael J. Oard

A concretion is: “A hard, compact mass or aggregate of mineral matter, normally subspherical but commonly oblate, disk-shaped, or irregular with odd or fantastic outlines; formed by precipitation from aqueous solution about a nucleus or center, such as a leaf, shell, bone, or fossil, in the pores of a sedimentary or fragmental volcanic rock, and usually of a composition widely different from that of the rock in which it is found and from which it is rather sharply separated.”¹ Sometimes, concretions have shrinkage cracks within that are filled with another chemical, such as calcite.² Concretions are isolated in the sedimentary rocks and usually represent a minor constituent of the enclosing rock or cementing chemicals. They range in size from pellets to spheroidal bodies up to 3 m or more in diameter.

Concretions are considered to have formed during diagenesis and shortly after sediment deposition. Diagenesis refers to: “All the chemical, physical, and biological changes undergone by a sediment after its initial deposition, and during and after its lithification, exclusive of surficial alteration (weathering) and metamorphism.”³ The diagenesis involves the diffusion and rapid depositional reactions with organic molecules and other constituents of the pore water. However, there are still unanswered questions on the origin of concretions.⁴

Concretions are rather common in sedimentary rocks around the world, especially fine-grained marine rocks. Fossils are often found at their centres. People sometimes mistake them for dinosaur eggs, fossils, extraterrestrial



Figure 1. Concretions in sandstone from near Winnett, Montana, USA (courtesy of Kevin Horton from the Institute for Biblical Authority)

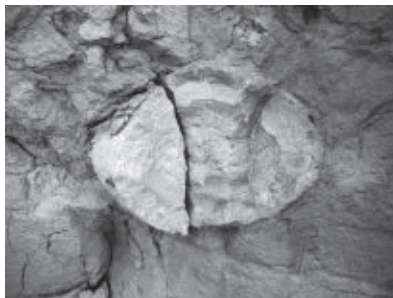


Figure 2. Cross section through one of the concretions found near Winnett, Montana, USA (courtesy of Kevin Horton)

objects, or human artefacts. Figure 1 shows several cannon-ball-shaped concretions in a sandstone from near Winnett, eastern Montana, USA. Figure 2 is a cross section through one of them showing the spheroidal deposition.

Since concretions are harder than the surrounding sedimentary rock, they can weather or erode out and accumulate on the ground. They are given such names as Moeraki boulders along the coast of South Island, New Zealand; Kouto boulders along the coast of North Island, New Zealand; Mokui Marbles that eroded out of the Navajo Sandstone in south-east Utah; and either coinstones or curling stones from the Lias Formation, Dorset, England.

Concretion formation not occurring today but considered slow

Concretions are not forming in modern sediments, which, like many

other phenomena, contradicts uniformitarianism:

“One of the great puzzles of early diagenesis is that although concretions are very common in rocks and are thought to be important products of early diagenesis, concretions similar to those in rocks have not been observed in modern sediments (Raiswell and Fisher, 2000). Indeed, Colman and Raiswell (1993) cite this discrepancy as a fundamental challenge to uniformitarianism.”⁵

The rate of formation of concretions is also not known, but like almost every aspect of geology, it has been considered a slow process. Such claimed ‘slow processes’ are a simple outgrowth from the belief in uniformitarianism and deep time. It has been believed to be caused by very slow advection of water during cementation,^{2,4} also considered a slow process. In concretions composed mostly of calcite, it has been difficult to account for the steep calcite chemical gradients across the margins of concretions, the nearly constant calcite concentration within the concretion, and the constant porosity within the concretion based on thin sections.⁶

Concretions form at least 1,000 to 10,000 times faster than previously thought

Yoshida *et al.* estimated the rate of calcareous concretions in fine-grained sedimentary rocks.⁶ They first noticed that at the edge of the concretions, there is a concentration gradient of CaCO_3 . They surmise that the concretion must have grown during early diagenesis soon after the sediment had accumulated. Based on the ubiquitous presence of decaying organic matter in the centre, HCO_3^- ions formed and diffused in all directions toward the margin of the concretion. The organic origin of the carbon in the HCO_3^- is supported by

low carbon isotope ratios, indicative of organic matter. At the same time Ca from the environment diffused toward the organic matter forming a growing CaCO_3 front that grew outward. The width of this front is proportional to the diameter of the growing concretion.

To find the rate of growth, the researchers used the diffusion coefficient in the Boom Clay of Western Europe which is about $10^{-6} \text{ cm}^2/\text{sec}$. From this they determined the rate of growth to be greater than 3–4 orders of magnitude (1,000 to 10,000 times) as fast as originally thought. This resulted in a rate of growth of about 0.5 to 50 cm/yr.

Flood geology implications

However, the Boom Clay is semi-consolidated and diffusion would be faster when the sediments were unconsolidated. The diffusion coefficient of unconsolidated fine sediments is more like $10^{-5} \text{ cm}^2/\text{s}$, about 10 times faster.⁶ Therefore, during early diagenesis before much compaction and cementation, the growth could be significantly faster. Based on figure 5 of Yoshida *et al.* growth could range from 5 to 500 cm/yr.⁷

Such numbers would fit nicely into a Flood scenario when sediments were rapidly accumulating during the Inundatory Stage of the Flood.⁸ There would be enough time to form concretions during the Inundatory and Recessive Stages of the Flood, and possibly a little after the Flood. Since concretions are of variable composition and internal structure, there may be other Flood mechanisms for their formation.

Ubiquitous calcareous concretions across the earth indicate that much dissolved calcite was in the floodwater sediments. Calcite is one of the major cementing agents for sedimentary rocks, and the formation of calcareous concretions indicates actively flowing calcite-rich water within the pores

of the sediment. Thus, the sediments laid down during the Inundatory Stage would be easily and quickly cemented by calcite cement, though there are other possible cementing agents.

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Some strengths and weaknesses of the polymer shield explanation for soft tissue fossils

Brian Thomas, Stephen Taylor, and Kevin Anderson

The presence of short-lived soft tissue in fossils has proven challenging for uniformitarians to explain. Wiemann and co-authors¹ describe a mode of preservation that may help explain the presence of primary protein remnants in fossil biomineralised tissues, including scales, teeth, eggshell, and bone. They showed results consistent with peptide cross-linking that forms N-heterocyclic polymers early in diagenesis.

Advanced Glycoxidation End-products (AGEs) and Advanced Lipoxidation End-products (ALEs) are a heterogeneous group of water-insoluble compounds generally formed by oxidation reactions. AGEs and ALEs resist water, chemicals, and microbes. They supposedly shrink-wrap adjacent proteins or proteinaceous remnants to shield them over deep time. The researchers summarized this preservation mode by saying:

“The generation of brown-stained proteinaceous material, and subsequently non-proteinaceous AGEs [Advanced Glycoxidation End-products] and ALEs [Advanced Lipoxidation End-products], provides an explanation for the apparent anomaly of widespread morphological and molecular preservation of soft tissues in fossil vertebrate

hard tissues. Both AGEs and ALEs exhibit hydrophobic behavior due to the chemical character of their crosslinks, which in turn shield adjacent peptides from hydrolysis. Thermo-oxidatively induced, intensive crosslinking of proteins results in hydrophobic, reinforced AGE/ALE scaffolds resistant to microbial digestion. This explains the preservation of fragile soft tissues in certain chemical environments through deep time.”¹

They offer two independent lines of evidence to support the model. Firstly, organics from both artificially matured and fossil tissues show brown staining. Secondly, both share Raman spectral characteristics. These include an increase with artificial or real age of a N-rich heterocyclic stretch peak and of a relative decrease in both Amide III and Amide II peaks that signal diminishing protein.

There is a biochemical basis for the claims of this study, which should be incorporated in future discussions of protein preservation. However, the researchers overstate their case. Their preservation model has several shortcomings and fails to adequately explain all the fossil tissue data.

Protein polymerisation: strengths

Experimental data connect artificially aged with actually old bone

Wiemann *et al.* have raised the bar of rigour in the defence of a protein preservation concept. They accept the robust literature that demonstrates and characterizes primary organics in fossils² and indeed admit original proteinaceous remnants in their fossils, including Jurassic sauropods. Explaining these fossil features within a multi-million-year time frame, however, is no easy task. Wiemann and her coworkers at least demonstrate some originality in their proposal

and offer two lines of experimental evidence in support.

Indeed, the polymer shield concept may help explain some published soft tissue descriptions. For example, one research team showed FTIR spectra of blood vessel-like structures in Triassic reptile bones.³ Both Raman and FTIR spectroscopy are infrared-based indicators of vibrational modes of specific molecular bonds. Ideally, more Raman spectra could be obtained from other soft tissue fossils to compare AGEs, but even collecting FTIR spectra would allow useful comparison. These researchers ascribe an increase in FTIR peak heights, as shown in their figures 5(f) and (g), to “amino acid residues and lipid structures”. These peaks may indicate AGEs or ALEs. Surmik *et al.* suggest a goethite micro-coating as a sort of thin mineral shield.³ More spectroscopic studies could look for some combination of mineral and AGE soft tissue coatings.

Wiemann *et al.* also offer a novel suggestion that brighter oxidative sedimentary matrixes have a better chance of forming the AGEs that make fossils darker. They reason that oxygen-rich burial environments should increase oxidation rates, AGE production, and thus preservation. They wrote:

“In identifying brown vertebrate hard tissue fossils in light coloured (oxidative) sediments as a target, our observation provides a first field guide to the search for endogenous soft tissues in fossil vertebrate remains as a basis for addressing a range of evolutionary questions.”¹

Possibly brighter sediments contain a higher ratio of soft tissues in fossils, but this needs to be tested, not assumed. Other results have shown soft tissues in dark-coloured (considered reducing) sediments,⁴ which negates the key feature of their field guide. Nevertheless, a field guide that could isolate fossils with higher potential

of preserved primary proteins is a worthwhile goal.

Protein polymerization: shortcomings

N-heterocyclic polymers may be absent from some specimens

Wiemann and coauthors report darkened soft tissue samples from demineralized vertebrate hard tissues including diplodocid, *Allosaurus*, and *Apatosaurus* bone and *Psammornis* and *Heyuannia* egg shell. Their model, though, fails to account for numerous reports of whitish soft tissue fossils.

Such white endogenous tissues suggest a lack of the N-heterocyclic polymers that are critical to the model. For example, colour images of soft tissue remnants from decalcified *Tyrannosaurus* femur published in 2005 show pale connective and vascular tissues.⁵ Admittedly qualitative in nature, the darkening expected from the polymer shield model is not readily apparent in colour images of soft tissues reported from decalcified moa, mammoth, mastodon, *Tyrannosaurus*, and *Triceratops* bone.⁶ Blood vessels extracted from some fossils have been described as ‘transparent’, and interstitial fibrous tissues as having ‘natural’ (which means life-like or primary, not diagenetic) pigmentation.⁶ Tissues from the *Brachylophosaurus* specimen “show the presence of white fibrous matrix that autofluoresced under ultraviolet light, consistent with collagen”.² The white matrix described in these reports does not match the brown colour that results from reactions forming AGEs. These reports suggest a need to continue to develop and test alternative preservation models.

Reactions forming AGEs will decrease the elasticity of tissues.⁷ Wiemann and co-workers also noted a specific texture to the tissue. They referred to darkened N-heterocyclic

polymers in general as “reinforced AGE/ALE scaffolds”. Yet, this form of reinforcement should cause stiffening of the tissue. For example, tissue specimens that retained some of the morphology and chemistry of blood vessels and nerves in decalcified Jurassic paleonisciform scales were “brittle and cracked”.¹

However, some published observations are difficult to reconcile with the reduction in flexibility inherent in peptide polymerization. For example, the still relatively bright *Tyrannosaurus* tissue was previously described by Schweitzer *et al.* as “flexible vascular tissue that demonstrated great elasticity and resilience upon manipulation”.⁵ Plus, blood vessels extracted from a *Brachylophosaurus* femur were “still soft, hollow structures”.⁸

Similarly, there does not appear to be even a hint of stiffening in a report of Ediacaran *Sabellidites* fossils:

“Minerals have not replicated any part of the soft tissue and the carbonaceous material of the wall is primary, preserving the original layering of the wall, its texture, and fabrics.”⁹

This study described the worm sheath as still “flexible, as shown by its soft deformation”.⁹ As noted, such flexibility is not consistent with the claims regarding the polymer shield model.

The polymer shield concept also clashes with immunological results. If AGEs shield proteinaceous material from microbes and water, they should also shield them from antibodies. However, neither molecular nor mineral shielding appears to have hindered antibodies from binding directly to dinosaur actin, tubulin, and PHEX.¹⁰

What is more, AGE formation results in changing amino acids into more stable aromatic heterocycles. However, this chemical alteration would interfere with identifying specific amino acid sequences, which is inconsistent with reports of specific

dinosaur protein sequences.^{11–13} Apparently, these particular protein fragments supposedly survived far longer than biochemical predictions without exposure to (and thus protection from) AGE-forming chemistry.

Finally, other reports describe original organics within endogenous soft tissues such as skin and visceral or cranial organs.^{14–16} Pliable tissue remnants found outside the originally hard tissues described by Wiemann *et al.* call for alternative or amended preservation modes. Although the set of fossils included by Wiemann and her colleagues show evidence of cross-linked peptide polymer shields,

other published results including those noted above that describe white or transparent, flexible tissues show no association with AGE's and thus do not conform to the shield model. Therefore, this report should instead have stated: “This *may* explain *some modest* preservation of fragile soft tissues in certain chemical environments ...”

A longevity experiment would address conflicting evidence

If polymer shields are real, can they last millions of years? Longevity experiments would add empirical support to the claim that

N-heterocyclic polymers shield nearby proteins through deep time. The colour differences and Raman spectra presented in Wiemann and coworkers may support the presence of N-heterocyclic polymers, and they may help explain the preservation of some fragile tissues, especially within the biblical time frame of thousands of years. However, neither colour change nor Raman spectra substitute for longevity experiments that would provide direct support for polymer shield persistence through deep time. The authors appear to accept a circular argument in place of an empirical determination of

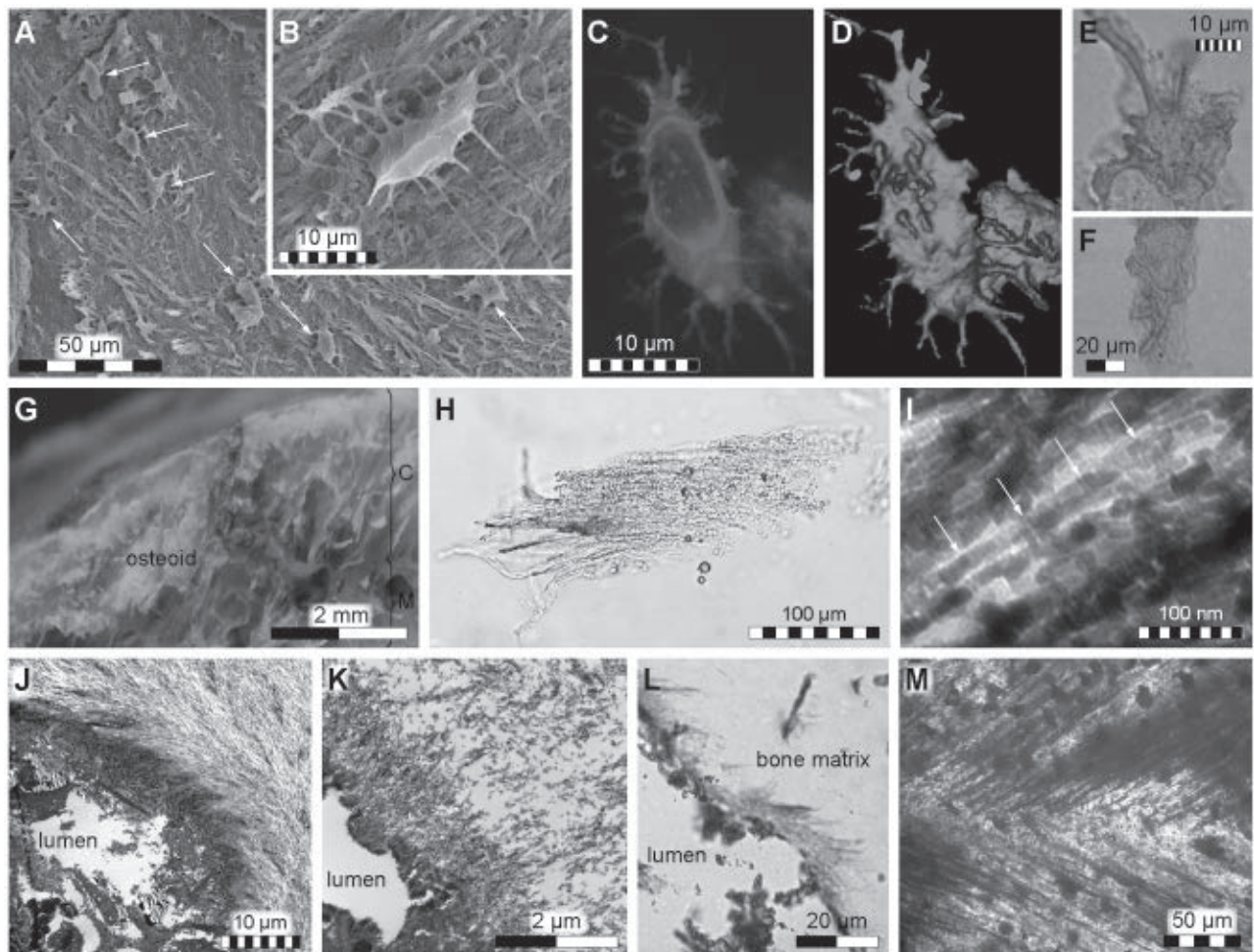


Figure 1. Cretaceous mosasaur soft tissues that are still bright, not darkened by the Toast model's AGEs. In particular, note: the light micrographs of E,F) likely osteocytes; G) whiteish, demineralized osteoid tissue showing cortex (c) and medulla (m); H) isolated fibre bundle; L) histochemically stained (blue) connective tissue; and M) untreated thin section showing fibres embedded in hydroxyapatite. (Images taken from Lindgren *et al.*, *Microspectroscopic evidence of cretaceous bone proteins*, *PLoS One* 6(4):e19445, 2011. Reprinted by permission of *PLoS One*.)

N-heterocyclic polymer longevity. Though not explicitly stated, they imply that because fossil tissue presumably has survived millions of years, then obviously the N-heterocyclic polymers within the fossil must also have survived through deep time. Experimental decay results could increase confidence in the accuracy of this aspect of their conclusion and could address several inconsistencies.

Firstly, data on the decay of synthetic polymers can help in understanding decay of fossil polymers. Plastics that are specifically designed to resist chemical decay and microbial degradation are thicker and more robust than AGEs, and likely comprised of higher molecular weights than polymers formed from fossilization. Yet even the most recalcitrant synthetic polymers can begin to break down within a human lifespan. “There are different types of polymer degradation such as photo-, thermal-, mechanical and chemical degradation.”¹⁷

In addition, there remains a need for direct evidence to support the assertion that AGEs resist microbes more than any unaltered proteinaceous material. The ubiquity of microbes, their known capacity to degrade all major classes of polymers, and their tendency to degrade polymers of biological origin more readily than synthetic polymers challenge the idea.¹⁸ Decay studies of AGEs/ALEs are therefore necessary to substantiate the claims made by Wiemann and her coworkers and to explain why fragile organic polymers should be expected to outlast robust synthetic polymers.

Bone collagen decay rates are well characterized,¹⁹ but it remains unclear how fast N-heterocyclic polymers decay. Since collagen is already known to be insoluble and slow to decay, it may well outlast AGEs. Without knowing either the proximity of these two organic components to one another or their respective decay rates, claims that N-heterocyclic polymers protect proteins are premature.

Conclusion

The N-heterocyclic polymer shield concept offered by Wiemann and co-workers has strengths and weaknesses. It does not explain the light colour, flexible texture, or immunological stain patterns of certain published soft tissue fossils. For this reason, it cannot be invoked to explain all soft tissue fossils, but only those that show evidence of AGEs. Also, decay features of synthetic polymers indicate that more work is required to justify the claim that diagenetic polymers persist through deep time, let alone the claim that they can shield nearby proteins for that long. The conclusion of Wiemann *et al.* went beyond their data and required longevity studies to justify it. Despite these important distinctions, introducing N-heterocyclic polymers in early fossilization contributes to the ongoing and challenging task of explaining soft tissue preservation over even thousands of years. The presence of these secondary polymers in fossils is bolstered by both darkening effects and Raman spectral evidence described by Wiemann *et al.*, but further research is needed to gauge their longevity and effectiveness in shielding nearby proteins.

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New evidence for rapid Ice Age deposition on the Greenland Ice Sheet

Michael J. Oard

Secular scientists postulate that the Greenland Ice Sheet has been generally the same size (at equilibrium) for the past several million years.¹ They envisage that as the snow accumulates it compacts the earlier, older layers. For the last 25 years, scientists have been drilling deep ice cores from the top of the ice sheet and counting what they believe are annual layers. They consider that as ice accumulates with time, these ‘annual’ layers in the Greenland Ice Sheet descend and become thinner and thinner, with the deepest layers becoming as thin as a millimetre (figure 1).

Researchers claim they have counted about 110,000 annual layers from the top to near the bottom of the GISP2 ice core.² This is considered overwhelming evidence that the short biblical timescale is wrong.³ However, their reasoning falls short on various levels. The millions of years is built upon assuming the astronomical or Milankovitch theory of ice ages which has many problems.⁴⁻⁷ When the researchers first counted the supposed annual layers, they only reached 85,000 years at the 2,800 m depth.⁸ Other scientists claimed this result was wrong because the time did not agree with that of deep-sea cores, also based on the astronomical theory. So, the researchers went back and increased

the resolution of one instrument from 8 mm to 1 mm and counted 25,000 more annual layers between 2,300 and 2,800 m, and voila! It matched.⁹

The creation science model postulates the ice sheets built up rapidly during the Ice Age caused by the Genesis Flood. Each layer represents a storm or a pulse in a storm. The thickness of the layers decreased after the Ice Age to the present rate of accumulation.^{1,10} So, if the annual layers were 6 m throughout the Ice Age, the annual layers would be compressed more near the bottom, possibly to around 2 m thick, while at the end of the Ice Age the post-Ice Age ice would compress the annual layer perhaps to only 3 m (figure 2). The amount of compression would depend on the weight of the layers above, and so would compress the earliest ice the most. Thus, the secular scientists are not counting annual oscillations but multiple variations per year due to storms, or even variations within storms. A new report on the analysis of volcanic tephra indicates that the layers could have been deposited much more rapidly than secular scientists believe, and is consistent with the creation science model.¹¹

Extensive Ice Age volcanism in the Greenland ice cores

It is well known that numerous layers of volcanic ash, tephra, and acid are found in the Ice Age portion of the Greenland ice cores. Based on acidity peaks and/or high sulfate spikes, likely from sulfuric acid from major eruptions, over 838 and 1,927 volcanic events have been identified in the GISP2 and NGRIP ice cores, respective-

ly.¹² However, sulfate peaks are not always good indicators of a volcanic eruption, since there are other processes that are able to produce sulfate. As of 2015, only 68 tephra layers, identified mostly by volcanic glass shards, have been found in the GRIP, GISP2, NGRIP, and Dye-3 Greenland ice cores.¹³ The tephra is claimed to have originated mostly from Iceland, although its atmospheric route from Iceland to Greenland is questionable. Greenland is north-west of Iceland while the prevailing winds today are from the west and rarely from the south-east. This would make it unlikely that many Icelandic eruptions reached central and northern Greenland, if the winds aloft were predominantly from the west as today.

In recent years, scientists have also been using cryptotephra to identify volcanic layers. These volcanic events are recognized by glass micro-shards, which are invisible to the naked eye and require a microscope to detect. These cryptotephra sometimes are associated with an acidity or sulfate peak, suggesting that the number of volcanic eruptions determined from acidity and sulfate spikes could be a *minimum*. Based on cryptotephra, as of 2015, 73 new tephra layers have been identified between 25 and 45 ka within the uniformitarian timescale. This makes a total of 99 tephra within this period.

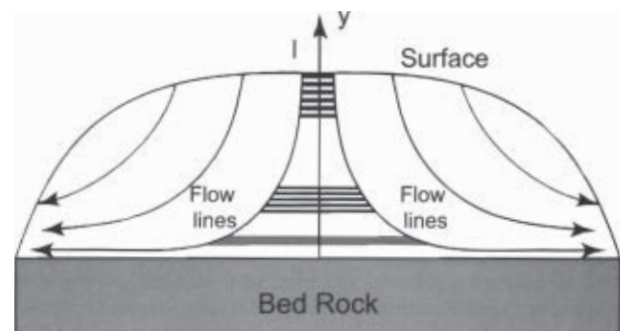


Figure 1. The Evolutionary-Uniformitarian long-age ice flow model, assuming equilibrium for several million years (from Oard,¹ p. 44). Note that the annual layers, shown schematically as horizontal lines down the centre of the ice sheet, thin considerably as each ice layer sinks deeper into the ice sheet as the ice accumulates over time.

Volcanism is well known to cool the surface of the earth for a few years. In the uniformitarian model, the few thousand volcanic events are stretched out over 90,000 or more years (i.e. the glacial phase of the uniformitarian 100,000-year glacial-interglacial cycle). Each eruption has only a short-term climatic effect of 1–3 years, and possibly up to 10 years, so they would not have a long-term effect on a uniformitarian ice age. However, in the creation science model, these eruptions are telescoped into several hundred years and so provide a powerful cooling mechanism over all the continents, thereby contributing greatly to the development of the Ice Age. The creation science short timescale derived from Scripture, instead of being an embarrassment, is *key* to understanding how summers over continental areas became cool enough to sustain an Ice Age.

The Antarctic Ice Sheet is young

Although extensive Ice Age volcanism occurred in the Ice Age portion of the Greenland ice cores, volcanism decreases dramatically downward in the Antarctic cores.¹⁴ This is strong evidence that the ages of hundreds of thousands of years are greatly inflated.^{15,16} Moreover, uniformitarian scientists arbitrarily dated the time the Antarctic Ice Sheet reached its current size to around 15 Ma ago based on presumed ice-rafted debris in ‘old’ deep-sea cores. This caused the uniformitarian scientists to extend their ‘ice age’ from 1.5 to 15 Ma. Anti-creationist geologist Arthur Strahler challenged creation scientists with this so-called ‘fact’:

“Increasing the duration of the Ice Age by a factor of about 10 greatly increases the stress upon the creation scientists, who must compress the events of 15 m.y. into 4,000 y. of post-Flood time.”¹⁷

However, if the Antarctic Ice Sheet were millions of years old massive erosion would smooth rough mountains. But the Gamburtsev Mountains, the

size of the European Alps, under the East Antarctic Ice Sheet show very little erosion.¹⁸

The Borrobol-type tephra in Greenland ice cores

Evidence for rapid deposition of the Greenland ice layers was found when scientists discovered two cryptotephra layers at depths of 1727.75 m and 1734.00 m within the GRIP Greenland ice core. These two cryptotephra layers, which could not be distinguished geochemically, are believed to correspond to the Borrobol tephra, or possibly the Penifiler tephra, both known from northern Europe terrestrial records and thought to have come from Iceland.¹¹ In fact, the Borrobol and Penifiler tephra are *also* very similar to each other.

The 6.25 m of ice separating these two cryptotephra layers corresponds to 106 years within the uniformitarian timescale. A single cryptotephra layer, which the study’s authors correlated to the upper cryptotephra layer in the GRIP core, was identified at a depth of 1582.75 m in the NGRIP core, just before the deglaciation sequence.

One volcanic eruption can have variable geochemistry caused by tapping different areas within one magma chamber, tapping multiple magma chambers, differences in wind velocity, changes in wind direction during eruption, mixing with non-volcanic material, reworking during deposition, variable percentages of incorporated vent wall rock, etc.^{19,20} Mount St Helens eruptions occur about every 100 years and their composition is quite diverse.²¹ So, although possible, it is unlikely that eruptions from the same volcano separated by 100 years would be identical. However, the cryptotephra would be separated by about a year or two in the biblical model, and so are more likely to have identical geochemistry than if separated by 100 years. Although Lowe *et al* believe it is possible for the same volcano to deposit the same

geochemical features of ash when the eruptions are separated by 3,000 years,²² they nevertheless admit:

“There will always be some compositional variance between shards from a single eruption (variation caused by magmatic processes or eruption from multiple magma bodies, post-eruption or post-depositional alteration, or instrument issues, described earlier).”²³

This suggests that the Borrobol-type cryptotephra were deposited over a much shorter time, likely from a single eruption. This is also supported from Quaternary sediments in Europe in which just one Borrobol-type tephra is found.

Another Borrobol-type tephra, supposedly about 3,000 years older than the other two GRIP cryptotephra, has been identified in the NEEM, GRIP, and NGRIP ice cores. But this one is slightly different from the younger cryptotephra in the GRIP core. Interestingly, this tephra is considered a ‘tie-point’ for dating marine deep-sea cores in the northern Atlantic Ocean. A tie-point is considered a known date that can be transferred from one time series (the plot of a variable with time) to provide a date for another time series. What if those who date marine deep-sea cores failed to closely analyze their presumed Borrobol cryptotephra? This could throw off their time series by 3,000 years.

Moreover, it is common for Quaternary time series to be dated by time series from other records. The dating is usually done by matching the shape of the time series or using tie-points of ‘known’ age, such as the time for the last glacial maximum, or the ‘date’ for the end of the previous interglacial.¹⁰ Beryllium spikes, magnetic excursions or reversals, volcanic eruptions, etc. are also used as ‘tie points’. For instance, the oxygen isotope ratios plotted down two deep-sea cores drilled in the north-eastern and south-eastern Mediterranean Sea were dated by ‘wobble matching’ to the oxygen

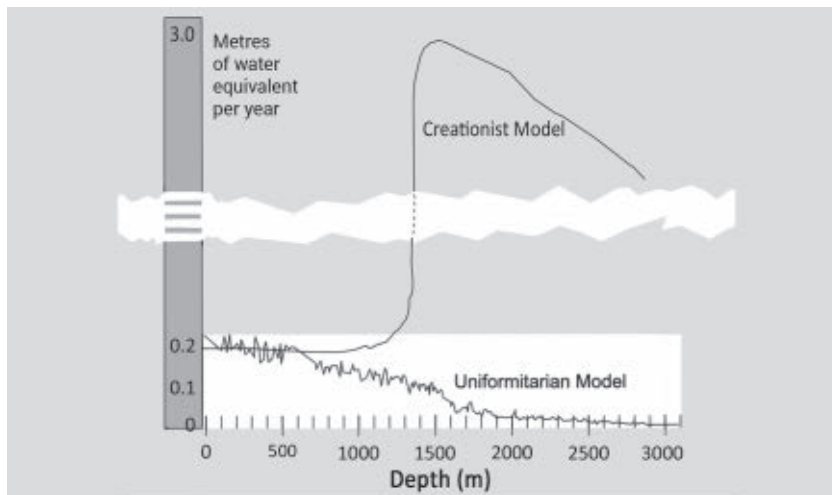


Figure 2. The thickness of annual ice layers down the GRIP ice core on central Greenland, calculated according to the evolutionary-uniformitarian model (from DeAngelis *et al.*²⁶) and the Creation-Flood model. It is assumed that the Ice Age annual layers were about 6 m thick but have compressed variable amounts down to a maximum of 3 m (from Oard,¹ p. 44).

isotope ratios from the Soreq cave near Jerusalem, dated by uranium-series.²⁴

Jake Hebert of the Institute for Creation Research has also documented the stretched-out timescale of the Greenland cores from a PBS show featuring Bill Nye examining a Greenland ice core.²⁵ Nye noticed a tephra layer at about the 27,000-year level that spanned, unbroken with no gaps, 15–17 years. Volcanic eruptions are usually quick and rarely last that long. It is more logical to believe that the uniformitarian interpretations of the ice cores greatly exaggerate the amount of time.

The Greenland Ice Sheet formed rapidly

It is unlikely that the same volcanic eruption would have produced identical cryptotephra separated by 106 years. It is more likely that the two cryptotephra represent just one eruption that lasted in total a year or two at the most, providing evidence that the ice between these two volcanic layers was deposited in a much shorter time than 106 years. This particular deposition occurred just before the deglacial sequence started when high accumulation was still occurring very

late in the Ice Age. Snow continued to accumulate for several hundred more years after the Ice Age at a decreasing rate (figure 2).

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Waterfall formation may not need tectonics or climate change

Michael J. Oard

Secular scientists make many assumptions about nature that lead to conclusions that contradict the Bible's history. For example, they once assumed that clay particles settle very slowly according to Stokes Law, which means that the claystone and mudrock in the sedimentary rock record, which make up over 50% of the sedimentary rocks, would take millions of years to form.¹ However, scientists have discovered that clay particles coagulate into floccules, called flocculation, which is a very common process in nature. This means the clay particles would have deposited much faster,²⁻⁵ and that there is no problem with the biblical timescale. Another assumed belief recently challenged is that waterfalls are the result of past tectonics or climate change.⁶

Origin of many waterfalls unknown

A knickpoint is a discrete steep reach (section) of a stream or river, while a knickzone is an oversteepened channel segment of a stream or river and may consist of a series of small rapids and/or waterfalls. The ultimate knickpoint is the waterfall (figure 1). It is assumed that knickpoints and knickzones formed as a result of falls of sea level, tectonic uplift, earthquakes, landslides, or changes in climate. In this model, the vertical change results in an acceleration of the water that causes a waterfall that

propagates upstream by erosion with time. Likewise, a change in climate to a wetter climate will increase the water flow and cause knickpoints or knickzones to develop and propagate upstream.

The distance the waterfall travels upstream allows scientists to estimate the time since uplift or climate change. Many estimates of the timing and amount of mountain uplift have been done this way:

"Thus, waterfalls and steepened channel segments (or knickzones) are used to reconstruct perturbations in environmental forcing, such as climate and tectonism, over millions of years."⁷

For example, the retreat of knickzones on Crete in the southern Aegean Sea suggests that Crete has uplifted 1 to 2 km in the past 4 million years.⁸ In another example, two periods of a more rapid uplift of the San Gabriel Mountains of southern California, USA, were deduced from three knickzones on Big Tujunga Creek.⁹ In yet another study of 236

waterfalls on the Waipaoa River and its tributaries on north-east North Island, New Zealand, the researchers determined that there was a pulse of uplift and climate change 18,000 years ago.¹⁰

It has also been argued that waterfalls can be created other ways, such as bedrock heterogeneities, or in the case of Niagara Falls because of the retreat of the Laurentide Ice Sheet. But this may only apply to a minority of waterfalls, since the origin of many waterfalls remains unknown:

"However, mechanisms controlling waterfall formation are poorly understood because waterfalls form and evolve over geologic timescales, making constraints on waterfall formation rare. Many waterfalls lack a known origin ..."⁷

Spontaneous formation of knickpoints and waterfalls

Researchers have recently discovered in a flume experiment that knickpoints, knickzones, and waterfalls, can



Figure 1. Upper falls on the Yellowstone River in the Grand Canyon of the Yellowstone, Yellowstone National Park, Wyoming, USA

form *spontaneously* in homogeneous rock with no external forcing.⁶ They indicate that major uplift, sea level fall, or climate change were not required. The experiment used a flume that was 7.3 m long, 30.5 cm wide, and tilted to a grade of 19.5%.¹¹

Most experiments use a ‘bedrock’ substance that is rather soft and can be easily eroded by clear water. However, it is known that the rocks carried along on the bottom or in suspension cause the erosion. So, the researchers used a hard ‘bedrock’ with a supply of unimodal gravel (i.e. gravel with clasts of similar size and density) in the water.

Within the first hour, an 8–10-cm-wide channel formed with continued incision leading to a ‘slot canyon’. Along the riverbed, decimetre-scale concave and convex undulations developed which grew in amplitude. Some of the knickpoints grew into waterfalls. Two waterfalls formed with peak heights of 35 cm and 38 cm. This result potentially can erase many tectonic or climatic deductions by secular scientists:

“If autogenic [not formed by an external force] waterfalls are common, their existence would change our interpretation of tectonic and climatic history recorded in river profiles”⁷

Conclusion

Recent research indicates that waterfalls are not necessarily indicators of past tectonic activity or climate change over millions of years. Waterfalls can form spontaneously even in homogeneous bedrock. Many of today’s larger knickzones and waterfalls could have been formed in this way by the retreat of the Flood water in channelized flow (about 4,500 years ago) or the melting of the ice sheets at the end of the post-Flood rapid Ice Age (about 4,000 years ago).

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AI and the secular vision to redefine life itself

Life 3.0: Being human in the age of Artificial Intelligence

Max Tegmark

Penguin Books, London, 2018

Lucien Tuinstra

Author Max Tegmark (born Shapiro) is a Swedish-American physicist and cosmologist, a professor at MIT,¹ and co-founder of the Future of Life Institute (FLI), a ‘beneficial AI movement’ (more on this below). In this, his second, book he discusses a wide range of scientific topics, including information storage systems (memory), learning, intelligence, and consciousness. As a believer in evolution and big bang cosmogony, who is actually best known for his cosmological theories, some of his statements will not resonate with all readers. Nonetheless, his historical views don’t really affect what is going on at present and what may (or may not) happen in the future with Artificial Intelligence (AI). Actually, arguments from design are rife throughout the book.

Books on AI-related topics (e.g. transhumanism) abound but *Life 3.0* gives an overview of what the future may hold, to laymen and experts alike. Tegmark’s previous book is titled *Our Mathematical Universe: My quest for the ultimate nature of reality*.² Perhaps the conclusion(s) of that work inspired the title of this book’s opening chapter: “Welcome to the most important conversation of our time” (p. 22). It’s a great one-liner to keep the reader engaged or lure in prospective buyers looking at the contents of this

best seller, but not one with which Christians will agree!

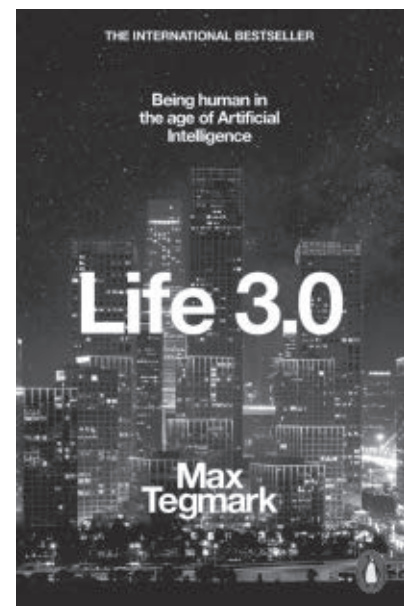
A momentous topic?

Tegmark envisions three distinct stages in life’s evolution (figure 1) and qualifies this important conversation about Life 3.0 “in terms of both urgency and impact” (p. 37). The urgency stems from a timescale shorter than the threat of “climate change” (p. 37), with the impact deemed to be worldwide. Life 1.0 is biological and replicates. What sets humans (Life 2.0) apart is that we have an added cultural aspect. Life 3.0 is the next stage, where technology will increasingly be implemented. Tegmark points out that humans really are at Life 2.1, as we already use implants, prostheses, and other such technology.

Assuming technology continues to increase, how do we feel about AI outperforming human beings on cognitive tasks and when do we think this will happen (figure 2)?

Undoubtedly, current technology outperforms us on particular tasks (e.g. pocket calculators, the best computer chess programs such as Stockfish). These examples of computational power are rather bespoke devices. Neither is good at anything else but its designed task (arithmetic and chess respectively) and cannot ‘think’ outside the box.

A breakthrough happened when AlphaGo (which plays the ancient Japanese board game Go) made an unexpected, counter-intuitive (creative?) move, going against thousands of years of human intuition, perhaps better explained here as a great confidence in long-term strategy. The surprise play proved key to the victory,



which became clear approximately 50 moves later. This may not seem very impressive at first sight, but the theoretical number of possible resulting games after this point of the game, move #37, is as follows:³

$$\binom{324}{50} \text{ which is } > 2 \times 10^{59}$$

AlphaGo’s achievement is impressive, but could AI improve on man-made strategies in cases such as the military, investment, and politics? Diligence is required given the great loss caused by some preventable (with hindsight) past situations. One company lost “\$440 million in forty-five minutes after deploying unverified trading software” (p. 96). Tesla’s self-driving car was involved in a deadly crash when the bright side of a lorry was interpreted as part of the bright sky. However, these examples should not turn us into Luddites.⁴ Humans, unlike AI, trespass the law with speeding and jumping the orange (or red?) light when they should stop. The root cause in the above examples is found to be, (a) sloppy programming (sometimes due to incorrect assumptions) or (b) incorrect

interpretation of sensing indicators. Thus, further steps are vital:

- a. Verification—"Did I build the system right?"
- b. Validation—"Did I build the right system?" (pp. 96–97)

We can agree that verification and validation relate to design, programming and assembly, software, and hardware. The question is: can these be done by non-human intelligence?

Did intelligence evolve from matter?

The easiest of these concepts to come to terms with is assembly. This already happens, for instance in car manufacturing. Software drives the hardware of those machines which assemble the various parts into a functional car. Life 1.0 (figure 1) is depicted by what some call a simple cell. Actually, surviving and replicating cells are anything but simple. They are bestowed by their creator with very sophisticated software that actively performs computations and stores them in memory. Memory is defined as an information storage system (e.g. a genome) and computations transform information, i.e. changing its memory state. Assembly cannot occur without software (whether computer-based or cell-based), which in turn demands an intelligent source.⁵

What about design and programming? Tegmark explains that a goal can be pursued by human intelligence (Life 2.0) but also by an adequate AI. He also believes evolution is goal-directed. The big question is whether

AI can become creative and even conscious (more on consciousness below). People, made in God's image, are creative—think of the arts—and make discoveries by "thinking God's thoughts after Him".⁶ Some might say that AlphaGo was also creative. However, possessing lots of knowledge and calculating power does not make one intelligent even if it gives the appearance of that very thing. A computer could calculate numerous routes to goal achievement. This is not intelligence, and in some cases even wastes time. What about the human experience—a gut feeling or intuition—that something might not work, so an alternative is chosen and fleshed out? Educated guesses are common for humans and they start early in life.

A key aspect of AI is learning (adding knowledge/gaining experience). Take face recognition, for example. That this is not yet flawless can be seen at airport security gates fitted with this feature, despite the strict rules imposed on passport photos (no smiles/hats/glasses etc.). If the person standing in front of the camera looks identical to the photo stored on file, this would be straightforward. Nevertheless, anyone who has travelled on a long-haul flight knows that one's appearance can change dramatically over the course of hours—think of a grumpy, unshaven, baggy-eyed face after the person has been jammed in a seat for the better part of half a day, not to mention the use of make-up, which can change appearances even quicker.

What about wisdom? Can AI become evil? No, not intrinsically. Only morally culpable beings can knowingly commit evil. However, an action may be perceived as evil by human beings, but for AI to know it as evil, it would need to be conscious. A hypothetical *evil* computer would *know* the correct answer to 1+1, but return something other than 2 on purpose, with the *intent* to deceive. In reality, most glitches are software related; rarely is there a mechanical failure. The perception of evil is likely due to misalignment of goals, and this is a sticky point, because we humans cannot get our goals aligned. Even when we think we have achieved it, there can be person-to-person differences in interpretation (sometimes underpinned by unspoken assumptions), leading to all sorts of consternation! Tegmark aptly highlights this with the story of the genie in the lamp. More often than not, the person's third wish ends up undoing the previous two wishes.

What might the future hold?

Computing memory size per dollar drops every two decades by a factor of 1,000. Computational power per dollar doubles every couple of years. It is now accepted that AI already exists on some level and specialists are increasing its sophistication continually.⁷ Is there any doubt that AI will multiply in years to come? AI outperforming human beings on specific tasks will certainly increase. This is not a cause for concern. Among billions of global citizens, chances are there is somebody better than you at any given task. Even if you are the most skilful in something, there are countless other tasks in which you are not the best. However, humans have a fabulous ability to do many things well, and yes, excel in a few. It is quite possible we could program a goal into an AI and it will master it







	Life 1.0 (simple biological)	Life 2.0 (cultural)	Life 3.0 (technological)
Can it survive & replicate?	✓ 	✓  Hello	✓  Hello
Can it design its software?	✗	✓  Hola	✓  Hola
Can it design its hardware?	✗	✗	✓  Bye!

Figure 1. The three stages of life (after Tegmark, figure 1.1, p. 26)

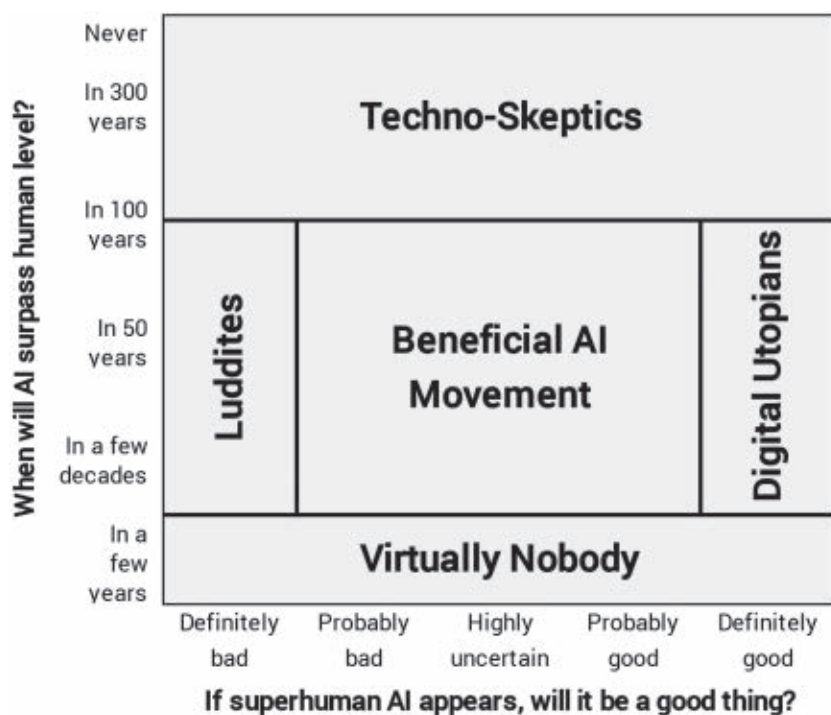


Figure 2. Distinct schools of thought regarding AI (after Tegmark, figure 1.2, p. 31)

(shown already with the Atari game ‘Breakout’⁸). In the future, Tegmark believes it could even build a robot (hardware) to beat humans at tennis, for example. But to master all its goals, this AI would need a vast number of combinations of software and hardware.

Tegmark describes a list of aftermaths following such a future intelligence explosion (rapid acceleration of AI). One of them is the ‘Protector god’ scenario: “Essentially omniscient and omnipotent AI maximizes human happiness” (p. 162). The AI operates in the background. This in contrast to the ‘Benevolent dictator’ AI, where everybody knows who is running the show.

Another scenario is the malevolent ‘Conqueror’, where AI “decides that humans are a threat/nuisance/waste of resources” (p. 162). This of course is lucrative fiction for Hollywood blockbusters, but, like the ‘Protector god’ and other scenarios, is based on an idea that intelligence can result from inanimate matter, which can serve as

information storage, but has no ability to freely manipulate that information in order for intelligent properties to emerge. Information comes from intelligent beings, not from goalless processes involving random chance. AI operates at the level of syntax and cosyntics (code+syntax), but lacks semantics, pragmatics, and apobetics.⁹

Human objectives regarding AI

Tegmark says that “most matter on Earth that exhibits goal-oriented properties may soon be designed rather than evolved” (p. 258) by AI. Indeed, the inanimate matter does not generate the goals, but the intelligent designers do. Critically, AI can only be useful if it has its goals aligned with those of humans. The author recognizes that humans don’t all have the same goals, which poses a greater problem underlying the next stages for AI to achieve (p. 260):

1. Learn our goals
2. Adopt our goals
3. Retain our goals

It all hinges on the words ‘our goals’. Whose goals? Analogically, if a law is legislation of morals, the question is: whose morals? On multiple occasions, Tegmark invites people to join the discussion, but more often than not, it is the rich or the powerful minority (usually both) that dictate how things turn out. Soberly but astutely, atheist Yuval Noah Harari commented: “If the future of humanity is decided in your absence, because you are too busy feeding and clothing your kids—you and they will not be exempt from the consequences.”¹⁰ Given the political (and spiritual) state of affairs, it is unlikely that a global consensus will be found. Despite Tegmark’s noble endeavours to make this a global approach, it will probably become a fragmented effort, with different authorities working on their own implementation of AI with different goals.

Tegmark shows his optimism of AI’s abilities with calculations demonstrating that future gains in technology are only limited by the laws of physics. Yet, he goes further, suggesting essentially that alchemy will make a comeback; that is, AI will be able to turn any material made up of quarks into any other material. It is not quite *creatio ex nihilo*, but not far from it. The underlying thought is that hydrogen was (presumably) converted into the other elements in the past so, going forward, this will be a process controlled by AI!

The fiction continues with the artificial assembly of humans, starting with “two gigabytes of information needed to specify a person’s DNA and then incubating a baby to be raised by the AI, or the AI could nano-assemble quarks and electrons into full-grown people who would have all the memories scanned from their originals back on earth” (p. 225)! On the other hand, without a body, “the prospect of infinite computation could translate into subjective immortality

for simulated life forms” (p. 232). Tegmark’s future vision of “many humans that take solace in a belief that their minds will live on after their physical bodies die” (p. 237) may very well appeal to people with his worldview, but does not apply to the Christian who has confident hope of also being granted a new body (1 Corinthians 15:44; Philippians 3:21). Needless to say, stripping out our five senses—among many other things—is a massive downgrade from, indeed a destruction of, real human life.

Superhuman intelligence and beyond

Tegmark considers that consciousness is by far the most remarkable “trait” of human intelligence (p. 184), but fails to recognize (or accept) that it is God’s image borne by humans that makes them special. His worldview is rather plastic. On the one hand, he says life evolved the way it did due to its goals (the fallacy of reification), but then acknowledges that (according to some) life on our planet evolved because of “a wild stroke of luck” (p. 243). He probably means that the fittest survived and survival, after all, was its goal (fallacy of begging the question). In the context of his broad definition that “consciousness = subjective experience” (p. 283), he quotes Yuval Noah Harari—who believes superhuman intelligent AI is a threat—from his book *Homo Deus*:¹¹ “If any scientist wants to argue that subjective experiences are irrelevant, their challenge is to explain why torture or rape are wrong without reference to any subjective experience” (p. 283). Unfortunately, he fails to discuss the moral implication of the word ‘wrong’. It is clear that conscious, morally culpable beings (i.e. humans) have judicial laws that make these two examples a crime. Bible believers point to *objective* standards, established by

a wholly good Lawgiver. Therefore, torture and rape are wrong, irrespective of the experience of the subject. This does not mean they deny the reality of the victim’s horrendous experience.

The ‘redundancy’ of the physical senses of post-mortem humans (whose intelligence was then ‘stored’ computationally), as hypothesized by AI proponents, would mean any experience that remained would be non-physical. There are many people that have one or more senses not working, yet they are conscious. Even people whose memories last a minute or less can be perfectly conscious. The Bible is clear that some living things (e.g. plants) were good for food from the beginning (Genesis 1:29–30). Other living things had an additional life principle (*nephesh chayyāh*). Members of the former category are not conscious, whereas the latter category contains (at least some) conscious members. Humans are a category set apart. They bear the image of God, and are also moral beings. From a Christian perspective, some might assume AI could be conscious but it would still not be alive in the biblical sense, let alone morally aware.

Tegmark ends on the following note: “It’s not our Universe giving meaning to conscious beings, but conscious beings giving meaning to our Universe” (p. 313). The first clause of this statement does not follow from the secular belief that conscious beings have ultimately emerged from inanimate matter, which he believes. And the Christian must also take issue with the idea that we are the ultimate attributors of meaning, a prerogative that belongs to God alone.

Conclusions

Tegmark’s *Life 3.0: Being human in the age of Artificial Intelligence* is a blend of science (verifiable prescriptions) and fiction (future

scenario descriptions). This makes the book readable, despite the somewhat abstract topics.

Life 1.0 is biological life and can survive and replicate. Life 2.0 is more than that; it is cultural, and can design its own software—e.g. learn additional languages. Life 3.0, according to Tegmark, will be able to do the same, plus design its own hardware.

He has a positive outlook on where Life 3.0 might be heading. Holding to a worldview embracing big bang cosmogony and evolution, he believes Life 1.0 and Life 2.0 came about by random chance processes (rejecting divine design), albeit with goals of some sort. However, he is adamant that Life 3.0 will be designed, yet does not see the glaring irony of his belief. A member of the beneficial AI movement, Tegmark believes that working together it *will* be possible in the next century or so to have superhuman intelligence, consciousness not necessarily excluded. Will anything then be impossible (cf. Genesis 11:6)? If AI with superhuman intelligence should come about, people would no longer be the ‘wisest’ entities (as designated by our species name *sapiens*). Therefore, he suggests rebranding human beings, in the age of Artificial Intelligence, from *Homo sapiens* to *Homo sentiens* (laying the emphasis on our five senses rather than our then-inferior intelligence).

Haven’t we been here before? ‘Uploading’ people would certainly stop them from being dispersed over the face of the whole earth (reminiscent of Babel). Bringing this full circle, Tegmark considers the discussion around Life 3.0 to be the most important of our day, whereas Christians instead focus on Life 4.0 (eternal life, only for those born twice). Therefore, the most important life focus is fulfilling the Great Commission (Mark 16:15).

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5. Smith, C., Lost in translation: the genetic information code points to an intelligent source, creation.com/genetic-code-intelligence, 6 May 2010.
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Einstein's physics says there is no biblical creationist starlight travel-time problem

The Physics of Einstein: Black holes, time travel, distant starlight, $E=mc^2$

Jason Lisle

Biblical Science Institute, 1st edn, 2018

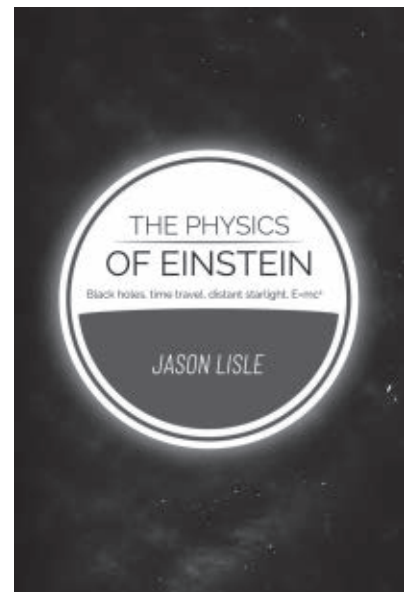
John G. Hartnett

There is no other biblical creationist book like this on Einstein's physics. Astrophysicist Jason Lisle explains the subject matter so that any educated non-specialist could understand. And while some sections contain equations, they are in isolated boxes so the reader may skip them and still follow the argument.

In the book Lisle addresses questions such as:

"Is it possible to travel faster than the speed of light? Will future human beings build spaceships that can travel at 'warp' speed like in *Star Trek*? Is time travel possible? If so, could we ever travel back in time to prevent a catastrophe from occurring? What does $E = mc^2$ really mean? What are black holes, and do they really exist? What would happen to a person who fell into a black hole, and how do we know? Is the universe really expanding? How long does it take starlight to travel from distant galaxies to Earth? Does this distant starlight require the universe to be billions of years old?" (p.7)

The book starts with a short history of Einstein and his discoveries in physics. Though Einstein never performed any physical experiments



to test his theory of relativity, today it is one of the best established theories of science.

Newton and Maxwell

Lisle first discusses Newtonian physics, including gravitation and Newton's three laws of motion. Newton realized that all motion is relative, i.e. any speed and direction of a particle is only meaningful with respect to a particular observer. As such, any experiment's outcome will always be the same for all inertial reference frames (a reference frame where the observer is not accelerating), though the measured values may vary. So Newton's laws of motion apply only to inertial reference frames. The earth is not an inertial reference frame but for some applications it is approximated as such.

Lisle next covers Maxwell's equations of electromagnetism. They

indicate that all electromagnetic radiation must propagate in a vacuum at an absolute speed—the speed of light. Maxwell developed his theory before Einstein developed his relativity theory in the early 1900s. However, Maxwell knew approximately the speed of light (c , currently defined as 299,792.458 km/s) and realized it was the speed indicated by his equations.

So there is a paradox. Newtonian physics indicated no absolute motion. All motion is relative to any observer. But Maxwell's equations indicated that all electromagnetic radiation must travel at c , regardless of the observer's frame of reference. Albert Einstein solved this paradox with his relativity theory.

Einstein resolved the paradox

Physicists at that time had made one false assumption which Einstein realized. Motion is relative to any observer but the speed of light is not. We say it is 'canonical' because it is a fundamental physical constant, and all inertial observers measure the same speed.¹

From chapter 2 onwards Lisle outlines how physics was changed by Einstein's key assumption. This resulted in *special relativity*, which does not consider the effects of gravity.

Then Lisle explains the consequences when gravity is added. This came through another key insight of Einstein, the *equivalence principle*. That states that any observer in an accelerating (non-inertial) frame cannot distinguish any measurement he might make from that he would make if in a uniform gravitational field.

Lisle clearly explains some of Einstein's thought experiments. They include trains or rockets (obviously hypothetical ones) travelling at near c . It predicts some very strange effects—e.g. on time, called time dilation.

Many have heard of the 'twin paradox', where one twin travels in a rocket

at some fraction of c and returns from a nearby star hardly aged at all while his twin has grown to old age. Relativity theory predicted many effects on not only time, but also on space (lengths) and masses, but we cannot review those aspects in detail here.

However, standard special relativity assumes the speed of light is isotropic—the same in all directions. Both Einstein's thought experiments and all laboratory tests of relativity assume this. The formula used to calculate any time dilation effect (like on the age of the twin who went off in the rocket) assumes an isotropic speed c .

The expansion of the universe and the big bang

Lisle discusses general relativity, and explains how Einstein's field equations applied to the whole universe were solved in the 1920s. Lisle somewhat oversimplifies the application of Einstein's field equations to the universe, though it's unavoidable in a semi-popular book. He correctly states that Alexander Friedmann first found a solution for the universe assuming an isotropic homogeneous matter distribution (known as the *cosmological principle*²). Georges Lemaître also found the same solution in 1927, but he also had observational data he thought indicated that the universe was expanding.³ Credit for that 'discovery' was however given to Edwin Hubble, who published in 1929.

Others also solved those field equations, including Einstein. But it seems Lisle has accepted that the Friedmann–Lemaître solution is the correct one because he goes on to state that the observed redshifts of galaxies indicate that the universe is expanding (p. 177).

However, we cannot be sure. Cosmology is not operational science. The universe is not a lab in which we do experiments like we might in an

Earth-based laboratory. Cosmology is at best historical science.⁴

Unfortunately, Lisle seems to accept the notion that the universe is a lab on which we can do repeatable experiments. He recognizes that the big bang is not scientific but suggests that future measurements may refute or confirm e.g. dark energy (p. 181). A refutation is possible but big bang cosmology relies on *dark matter and dark energy*, so no matter what is observed the paradigm will be very difficult to kill off. I still think these are necessary fudge factors, and if the scientists operated by the same standards they use in their Earth-based labs the increasing need for all of these *dark entities* would fatally undermine the Friedmann–Lemaître model.

The real issue is that cosmology is underdetermined.⁵ There are potentially many different models that might describe the same observational data. It's not clear that Friedmann found the correct solution for the universe and therefore the universe is expanding. Galaxy redshifts may be explainable by other mechanisms.⁶

Nor is it clear that Scripture describes an expanding universe. God spoke through human agents and used the cultural and linguistic knowledge they had at the time. When similes are used (e.g. referring to glass, curtains and tents) they make no connection to the well-known rubber sheet analogy for the expansion of space in big bang cosmology.⁷

The curious case of the one-way speed of light

Chapters 17–19 deal with the question of distant starlight: How do we see it when the universe is only about 6,000 years old?

Most attempts to measure the canonical speed c have involved some apparatus that reflected a light signal back to the source. These measurements calculate the round-trip,

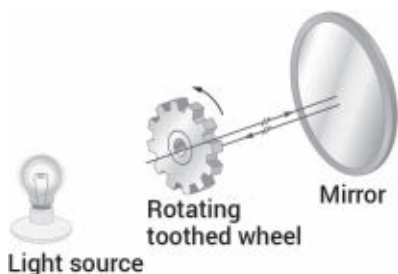


Figure 1. Historically, the speed of light was measured by Fizeau by reflecting a light signal from a mirror and timing the round-trip with a toothed wheel. This is clearly a two-way speed measurement and not a one-way measurement.

time-averaged speed also known as the two-way speed of light, because an outgoing and an incoming signal is used. There have been several proposals (even claims) to measure the one-way speed of light, but these have all turned out to be the two-way speed due to some implicit unrecognized assumption.

Why would the speed of light be different outgoing to incoming? Lisle answers:

“I don’t know of any reason why they should be different. But then I don’t know of any reason why they would be the same. People might emotionally prefer the symmetry of having the speed from A to B be the same as the speed from B to A. But does preferring something automatically make it so? Should we expect the universe to conform to our emotional preferences?”

If there is one primary truth that we learn from the physics of Einstein, it is that the universe does not always conform to our preferences or expectations.” (p. 209)

So why just assume, without evidence, the one-way speed of light is the same in all directions? One would need to measure the one-way speed. To do so one needs to exactly time the passage of a signal from points A to B, which are separated by some distance. Therefore, one needs synchronized clocks at A and B so that when the

light signal is received at B we know what time it left A.

So how does one synchronize clocks separated by a distance? As it turns out the only method is to send a light signal from B to A to synchronize B with A. But then when A sends back a light signal to B it becomes a two-way round-trip measure. Measuring the one-way speed on the return journey from A to B doesn’t work because it means we need to know the one-way speed from B to A. We need to know the one-way speed of light to measure the one-way speed of light.

Simultaneously sending radio pulses to A and B from M halfway between A and B does not work because it assumes the radio pulses travelling M to A and M to B, which are opposite directions, travel at the same speed.

And there is no getting around this problem, it is a catch-22. No matter what method you use, light, radio signals, sound waves through a rod, or whatever, it always means it is a two-way measure of the speed of light (p. 214).

But can we use what is called *Slow Clock Transport*? We take two clocks at one location and synchronize them. Then we separate one from the other very slowly and they should remain synchronized. However, special relativity indicates time dilation will occur if we move a clock with respect to another. Slow transport tries to minimize the effect—time dilation is assumed to be zero because the speed of moving one clock is very slow. But this again assumes the one-way speed of light is the same in all directions because time dilation physics depends on the one-way speed of light. Most text books on special relativity, with which the reader may be familiar, assume the isotropic one-way speed of light, which is the two-way speed c . Once again, the argument is circular.

Or didn’t Danish astronomer Ole Rømer in 1670 measure the one-way

speed of light using Jupiter’s moons, particularly Io, as a clock? No! The details show it was a two-way speed measurement (and remarkably close to the modern-day measured value). Rømer assumed his clocks ‘ticked’ at constant rates regardless of whether Earth was moving toward or away from Jupiter. Since he reasoned that the duration of the eclipsing of the moon Io with Jupiter varied according to Jupiter’s distance from Earth totally because of the change in the light-travel distance, he implicitly assumed the isotropic (two-way) speed of light. He didn’t account for any time dilation effects. He wrongly assumed that time is absolute, and not affected by velocity.

The one-way speed of light issue has been debated for about 100 years. It has been found that no experiment can ever measure it. All experiments measure the two-way speed. As such, it seems it does not matter what we assume for the one-way speed, provided the round-trip speed always averages to c .

The epsilon equations

In 1970, John Winnie showed that the measurable effects of special relativity only depend on the round-trip speed and not on the one-way speed.⁸ So, whatever the one-way speed might be, it can have no effect on the measurable physics in the universe. The one-way speed “only affects how we define ‘simultaneous’ and thus how we time stamp various events.” (p. 221)

Winnie used the symbol c for the canonical two-way speed and introduced anisotropy via the symbol ϵ (Greek symbol epsilon). This is referred to as the Reichenbach synchronisation parameter.

Any choice of ϵ between 0 and 1 is valid. Einstein’s derivation of special relativity assumes $\epsilon = 1/2$, representing the isotropic speed of light (i.e. the

one-way speed is the same in all directions). All other choices are anisotropic. For $\epsilon = 1$ the inward-directed (to the observer) speed of light is infinite and the outward-directed speed is $\frac{1}{2}c$. In such a case (and all valid cases) the average round-trip speed is c . Winnie even derived special relativity equations for time dilation and length contraction, due to relative motion, without assuming a value for ϵ .

Lisle uses these equations to illustrate the relativistic effects when non-isotropic propagation is assumed, i.e. when $\epsilon \neq \frac{1}{2}$. The time dilation equation gives a much stronger effect when $\epsilon \neq \frac{1}{2}$ than when $\epsilon = \frac{1}{2}$. For $\epsilon = \frac{1}{2}$, the time dilation effect is quadratic in velocity. But for $\epsilon \neq \frac{1}{2}$ there is an extra term in the time dilation equation that is quasi-linear in velocity. This means that at low velocities time dilation strongly affects any measurement, and is strongly direction-dependent.

For *slow clock transport*, with $\epsilon \neq \frac{1}{2}$, even as velocities go to zero, a large time dilation term should be included, which depends on the distance of separation of the two clocks and the two-way speed of light. Thus the clocks are not synchronized. Only when $\epsilon = \frac{1}{2}$ is chosen (isotropic speed of light) will the two clocks remain synchronized. Hence by assuming that the clocks are synchronized it is logically equivalent to assuming that the one-way speed of light is the same in both directions. Thus it is impossible to objectively measure the one-way speed.

But this is what Rømer was attempting to do. How did he get the correct value for the two-way speed when he was trying to measure the one-way speed of light?

“Essentially, he made two (potentially incorrect) assumptions that exactly cancel. He assumed (1) negligible time dilation and (2) $\epsilon = \frac{1}{2}$ (the one-way speed of light is the same in both directions).” (p. 229)

These two assumptions are related.

As seen from the Rømer measurement the full time dilation formula depends on ϵ in such a way that we can never distinguish the effects of time dilation from the optical lag due to the light-travel time. Thus it would seem we are free to choose the one-way speed of light.

This seems frustrating to many. Some suppose there must be a way to objectively measure the one-way speed. But both history and the physics tell us that it is highly unlikely.

Others suppose that a one-way speed does have an absolute objective value and that it should be the same in all directions but that it is impossible to measure it—even in principle. They might think this is how God would have made the universe. But our experience with the physics of Einstein should tell us otherwise. The notion resembles the once-believed-in luminiferous ether, which allegedly provided the medium for light to propagate through. It was once believed that an absolute frame existed where the ether is stationary. But Einstein showed that since the laws of physics are the same for all inertial frames it is impossible to detect the frame of the ether, and that led to the rejection of such a frame as having anything meaningful to say about the universe.

The third option is that perhaps there is no objective observer independent value for the one-way speed of light, in the same way that there is no absolute velocity rest frame.

The conventionality thesis

“As strange as this may seem, it appears that the one-way speed of light is not a property of the universe, but rather a humanly-stipulated convention. It is something that we are free to choose, and then our choice allows us to have a definition of whether or not two clocks separated by a distance are synchronized

(relative to a given observer).” (p. 235)

This is what we call the *conventionality thesis*. It has been disputed for over a century and never disproven. Most physicists agree it is true. This was definitely Einstein’s view. Thus, we are free to choose a value of ϵ and use it to synchronize our clocks, provided that the round-trip speed is c . Most choose $\epsilon = \frac{1}{2}$, with the one-way speed of light the same in all directions. Einstein used it because it greatly simplifies the equations of special relativity and creates a symmetry, which is very convenient to solve physics problems. This choice bears his name—the Einstein Synchrony Convention (ESC).

Objections to the conventionality thesis

Lisle writes that the most common objection is philosophical and not scientific. They ask, why would the speed of light be different in different directions? But again, to measure the one-way speed of light you need two synchronized clocks separated by a distance. But synchronisation is observer-dependent. Thus there is no way to synchronize two distant clocks such that all observers will agree they are synchronized. Different observers will disagree on the one-way speed of light as measured by those same clocks. Therefore, the one-way speed of light is not an objectively meaningful concept in this universe. To say that the one-way speed of light is ‘really’ the same in all directions, or ‘really’ different in various directions amounts to claiming that the correct unit of measure is feet and not yards.

Another objection is that Maxwell’s equations of electromagnetism show that the one-way speed of light must be the same in all directions. But Maxwell’s equations are derived in a closed system; i.e. they are most often implemented using integrals around

closed surfaces. As such, they can only ever produce the round-trip speed of light.

The way the equations are usually written appear to imply that the one-way speed of light is c . However, the equations tacitly *assume* symmetry, i.e. $\varepsilon = 1/2$ and thus the propagation speed c can only be a measure of the two-way speed of light. If Maxwell's equations are written in the more generalized form⁹ where ε can take any value then we find that the propagation speed of light v depends on the direction of propagation and the value of ε , as follows:

$$v = \frac{c}{2\varepsilon} \text{ for the negative } x \text{ direction}$$

$$v = \frac{c}{2 - 2\varepsilon} \text{ for the positive } x \text{ direction}$$

If you substitute $\varepsilon = 1/2$ for the isotropic case you get $v=c$ for both positive and negative propagation directions. This is then the standard way of writing Maxwell's equations. But for all other cases where $\varepsilon \neq 1/2$ the velocities in the two opposite directions are not equal and range between $1/2c$ and infinity for all allowed values of ε between 0 and 1.

So Maxwell's equations can never be used as an argument against the conventionality thesis. But as we saw, when expressed in their full generalized form they allow for the one-way speed of light to be different in different directions. Their standard form is just the special symmetric case with $\varepsilon = 1/2$ and hence they cannot be used to show that $\varepsilon = 1/2$.

The Anisotropic Synchrony Convention (ASC)

The ESC, by setting $\varepsilon = 1/2$ results in the physics being greatly simplified, making it a convenient choice. But another useful choice is to set $\varepsilon = 1$. Under this convention the outgoing light travels at $1/2c$ and the incoming light travels at an infinite speed, arriving instantly.¹⁰ Lisle named this

the Anisotropic Synchrony Convention (ASC).

Under the ASC, because the one-way speed of light towards the observer is infinite, events are time stamped the moment they are first observed. This is quite different from the ESC, in which the speed and direction of the observer must be considered when comparing the moment any observer determines the event occurred. Why? Time dilation due to their relative velocity affects the answer they would calculate. Thus under the ESC, the determination of whether two distant events are simultaneous depends on the observer's velocity.

But under the ASC it doesn't. All Earth-based observers would agree on the timing of celestial events when the ASC is used. However, if two inertial observers are not co-located they will not agree on the simultaneity of the same distant events. There is no possible synchronisation system that would allow all observers to agree on whether two clocks separated by a distance are synchronized. This is just the way God created the universe.

However, a subset of observers with the common property that they all have the same velocity (regardless of their location), using the ESC, will agree on whether two clocks separated by a distance are synchronized. Different observers with different velocities will disagree. Conversely, a subset of observers with the common property that they are all co-located (regardless of their velocity), using the ASC, will agree on whether two clocks separated by a distance are synchronized. But observers at different locations will disagree. These are the two special cases. For all other synchrony conventions with $\varepsilon \neq 1/2$ and $\varepsilon \neq 1$ simultaneity depends on both velocity and position of the observer.

Therefore, when computing relativistic effects due to velocity the ESC is the better choice, but when computing the timing of distant events

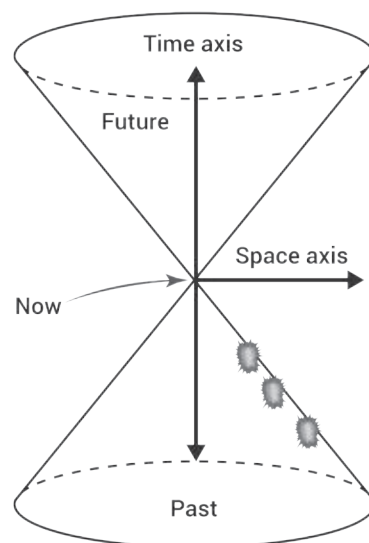


Figure 2. The light cone drawn under assumption of speed of light c . The flashes in the past light cone indicate celestial events which are seen 'now' (in real time) under the ASC but in the past under the ESC.

the ASC is the better choice since it does not depend on observer velocity but only her position. Thus, all Earth-based observers using the ASC will agree on the simultaneity of distant events. Using the *spacetime* diagram (figure 2) the ASC defines the surface of simultaneity as the past light cone. Note the flashes on the surface of the past light cone in figure 2. 'Now' extends to all events on the past light cone. The 'past' itself is not visible under the ASC. On the other hand, the ESC defines the surface of simultaneity as the horizontal plane perpendicular to the time axis exactly between the past and future light cones. See the solid arrow labelled 'Space axis' in figure 2. Each convention defines an observer-dependent 'now' with the ESC depending on the observer's velocity and the ASC on the observer's position.

One can freely convert from one convention to another. It is merely a change of coordinates and does not change the physics. In fact, this is routinely done. The ESC provides for the simplest equations to calculate

with but one can also use the full ε -dependent equations.

The distant starlight problem

For many skeptics and even believers, distant starlight is the biggest problem for the Bible. The history given in the Bible cannot be made to exceed c . 6,000 years. So how do we see distant galaxies billions of light-years away? By definition, the speed of light c is one light-year per year. We must also conclude that we are actually seeing light that left those distant galaxies. We don't doubt the distances. Thus, some critics claim distant starlight shows that Genesis is wrong.

But once we understand the consequences of the physics of Einstein, the critics' arguments run into problems. They claim that the time between light leaving the distant galaxy and when it arrived at Earth is billions of years. But they have not specified the observer's frame of reference, and have ignored time dilation, but most significantly they have assumed the ESC is absolutely the correct convention to use; meaning that the one-way speed of light *must be* c .

Since light coming from distant galaxies travels one-way to Earth, the time it takes to get to Earth is the distance divided by the one-way speed of light. But we have seen that is conventional; we are free to choose it. Under the ASC the incoming speed is infinite and the travel time is zero. There is no travel time. Thus under the ASC we are seeing all of the universe in real time. The 'now' we experience on Earth is the same 'now' for the whole universe that we see. Only in that sense do all Earth-based observers agree on a universal 'now'. Differently located observers would not agree.¹¹

The challenge for the critic is to show not only that the conventionality thesis is wrong but also to show, by an experiment, that the one-way speed

of light is indeed c . So far no one has shown either. Therefore distant starlight is not a rational objection to the 6,000-year biblical timescale.

Does the Bible use a synchrony convention?

In the second last chapter of the book Lisle deals with some common objections not dealt with elsewhere. But, they fail to show the ASC false. The only question that remains: is the ASC legitimate from a *biblical* standpoint?

Several times the Bible mentions celestial events occurring at a particular time. Therefore, some synchrony convention is used. But if the Bible uses the ESC to synchronize clocks and for 6-day creation of the universe, then the distant starlight question remains unanswered. However, Lisle gives several reasons to think the Bible uses the ASC:

- Until modern times the ASC was the standard synchrony convention. According to their records, ancient astronomers used it for when celestial events occurred. They did not subtract any light-travel time. They knew neither the distance to the objects nor the speed of light.
- There is no evidence anyone used the ESC before the 1670s. Rømer was perhaps the first person to estimate a light-travel time from a distant source. He effectively assumed the one-way speed of light was the same as the round-trip speed, which is only true under the ESC. Since the Scriptures were written long before Rømer it seems reasonable that they too used the ASC. (This involves the implicit assumption of an infinite one-way speed of light.)
- But couldn't God have used the ESC long before c was first measured? Yes, but if He did, since nobody had yet thought of it, the ancients would not have correctly understood the Bible.

- God used the linguistic convention of the time and people group to whom the biblical text was written. This would include how we describe events observed in the cosmos. And they used the ASC.
- The difference in ESC or ASC for timing events is of little consequence¹² except when timing celestial events. Events observed today, by the ESC occurred in our distant past. But by ASC reckoning they took place today. Conversely, distant events that take place today, under the ASC, are seen today—instantly when they occur. But under the ESC they will not be seen until some distant future time.
- Biblical descriptions of celestial events indicate that the light travelled to Earth instantaneously. Genesis 1 says the celestial bodies included the stars (verse 16), and they were all created on the fourth day (verse 19). Verse 15 indicates that they were created 'to give light on the earth' but also it says 'it was so'. That is, the light from the stars illuminated the earth on the same day they were created. No delay, as per the ASC. Other examples are Psalm 33:9 and Isaiah 48:7, 13.

In conclusion, there is no distant starlight problem under the ASC because the universe appears in real time. What we call 'now' here on Earth is 'now' everywhere else in the universe. The language of the Bible uses a valid timing convention—the ASC—by recording all events when they are observed to happen. Objecting to its use makes about as much sense as objecting to the Bible for using cubits instead of the metric system of measurement.

I strongly recommend the book. It is an excellent resource and should find itself on the bookshelf of every keen biblical creationist irrespective of their understanding of the ASC. The book clearly shows that the physics of Einstein supports a biblical worldview.

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- Initially the speed of light was measured using standard length measures, but it was realized that the speed of light is fundamental to nature but length is not, and now, by international convention, c is defined.
- The cosmological principle also states that there are no special places in the universe, i.e. it has no centre or edge. Thus any observer anywhere in the universe would, on the largest scales, see roughly the same distribution of matter. That is a greatly simplifying assumption that made it possible to get a solution of the Einstein field equations, but it is not necessarily the truth.
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- For example, hypothetical observers on a planet in the nearby Alpha-Centauri system 4.3 light-years away would experience a different 'now' to those on Earth. They would see the same celestial event but offset by 4.3 years due to the time dilation factor. However, because there are no other living beings elsewhere in the universe, Earth is the only planet with sentient life, the universal 'now' we experience here is the only relevant one.
- The light-travel time between any two places on the surface of the earth is extremely short—much less than a second. No human could perceive such a delay.

Rigid uniformitarianism and a hysterical fear of the scientific creationist bogeyman

Timefulness: How thinking like a geologist can help save the world

Marcia Bjornerud

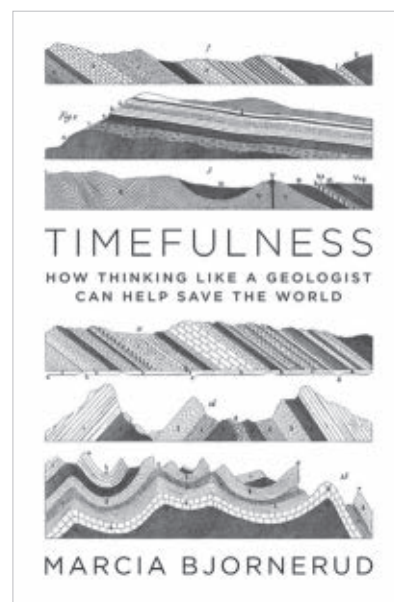
Princeton University Press, Princeton and Oxford, 2018

John Woodmorappe

Marcia Bjornerud is identified as professor of geology and environmental studies at Lawrence University. This lite book is a rather superficial overview of natural history, as viewed through the lenses of the evolutionary-uniformitarian paradigm. With this, the author attempts to connect historical geology with her obvious climate change and environmentalist agendas. The latter includes her prejudices against fracking, which features an uncritical repetition of claims about the alleged environmental damage that it causes. She also throws in some jibes against creationist scientists, including her dislike of creationist uses of evidences that support the creationist position.

Rapidly crystallized macroscopic igneous minerals

About the only positive feature of this book is the recognition that the crystals in pegmatites can grow at rates of inches per year (p. 127). (Throughout my years of undergraduate geology training, I was taught, as indisputable fact, that millions of years are necessary for crystals in a cooling magma to grow to macroscopic size.) In contrast, a



cited study¹ arrives at galloping crystal growth rates of 10^{-6} cm/sec to 10^{-5} cm/sec. This comes out to a 1 cm crystal grown from the magma in 1–12 days.

Doctrinaire uniformitarianism

The author effortlessly confuses observation and interpretation whenever she discusses geology. For example, she brings up (as monotonically do so many other books) the unconformity at Siccar Point, Scotland (figure 1), and how it 'confirmed' to James Hutton that the earth must be very old. In common with virtually all uniformitarians who use this 'evidence', Bjornerud does not show even a glimmer of skepticism in the premise that the erosion needed to create an unconformity requires vast amounts of time to happen.

Bjornerud's treatment of isotopic dating is no better. She admits (p. 49)

that different minerals from the same rock commonly yield different dates, but assures us, after the fact, that this is “expected” because different minerals have different closure temperatures. This is the special pleading inherent in uniformitarian dating methods: Isotopic dating is valid because its results are consistent, while at the same time inconsistencies are ‘expected’. Heads I win, tails you lose. She also (p. 54) presents the $^{40}\text{Ar}/^{39}\text{Ar}$ plateau as proof of closed system over time. It is not. Results showing a plateau can be obviously incorrect, and must be explained away.²

The author brings up plate tectonics as proof of the validity of the standard uniformitarian geologic age system. In doing so, she appears to be blissfully unaware of creationist work on catastrophic plate tectonics. The prominence of catastrophic plate tectonics in creationist literature and on creationist websites makes her ignorance of this fact all the more inexcusable. (My saying this does not imply support for catastrophic plate tectonics. I favour the use of multiple working hypotheses by creationists, and this includes the development of models that allow for static continents as well as those that allow for moving continents.)

Scorning creationists and running away from the evidence of rapid metamorphism

The issue in question was summarized by Bjornerud³ in another publication as follows:

“A reservoir-flux systems model is used to explore the interplay among the hydrologic, metamorphic and deformational processes recorded in these rocks. The model suggests that the metamorphic ‘event’ may have been remarkably brief ($<<1$ My) and governed by subtle interactions among phenomena over a wide range of scales.”

Now all this is revolutionary because, according to standard uniformitarian dogma (which I well remember from both undergraduate and graduate school), it takes countless millions of years for metamorphic rocks to form. The possibility that any kind of metamorphism could rapidly occur, even given the constraints of the kind of slow mountain building that is assumed to unfold within the context of uniformitarianism, is startling.

Marcia Bjornerud is visibly upset that scientific creationists have located her work, and dismisses these scholars with these patronizing words:

“We used some theoretical constraints to suggest that in this case, the spotty metamorphism might have happened in thousands or tens of thousands of years, rather than the hundreds of thousands to millions of years in more typical tectonic settings. This ‘evidence for rapid metamorphism’ is what someone at the Institute for Creation Research grabbed onto and cited—completely ignoring the fact that the rocks are known to be about a billion years old and that the Caledonides were formed around 400 million years ago. I was stunned to realize that there are people with enough time, training, and motivation to be trawling the vast waters of the scientific literature for such finds, and that someone is probably paying them to do it. The stakes must be very high. For those who deliberately confuse the public with falsified accounts of natural history, colluding with powerful religious syndicates to promote doctrine that serves their own coffers or political agendas, my Midwestern niceness reaches its limit” (pp. 10–11).

Oh dear! How *dare* any intelligent person think differently from the uniformitarian! Note also that Bjornerud does not point to any error in the creationist use of her work (and

fails to mention that the author of the piece in question is just as well qualified in geology⁴). All she can do is try to confuse the issue by bringing up the inferred great age of the rocks (an issue entirely separate from rapid metamorphism) and then get all emotional about what she imagines to be the malevolence of creationist scholars.

A pathological prejudice against independent thinkers

The author’s aversion to creationist scholarship goes even deeper. It borders on hysteria. She confesses:

“My colleagues and I despair at the existence of atrocities like Kentucky’s Creation Museum, and the disheartening frequency with which young earth websites appear when students search for information about, say, isotopic dating” (p. 9).

Someone who has survived a massacre will no doubt be offended by Bjornerud’s usage of ‘atrocities’, regardless of how he or she feels about creationism.

Some old chestnuts

There is nothing new under the sun, and this is especially true of anti-creationists. Author Marcia Bjornerud dusts off the old Haldane argument that the discovery of a Precambrian rabbit would falsify the evolutionary-uniformitarian timescale. It would



Figure 1. The endlessly quoted unconformity at Siccar Point, Scotland—a perennial but unproven argument for an old earth.

not. The Class Mammalia would be redefined as a polyphyletic group, with some mammals arising in the Precambrian and the rest in the early Mesozoic.

She also re-exhumes Dobzhansky's self-serving wisecrack that "Nothing in biology makes sense except in the light of evolution." Tell that to Linnaeus, who, while disbelieving evolution and accepting Special Creation, invented the system of classification still used by biologists today. Then tell it to evolution-disbeliever and creationist Gregor Mendel, who discovered the laws of genetics. And so on.

We are, once again, assured that Genesis makes God out to be a deceiver. Either that, or Genesis is an 'offensive dumbing down' (to whom?) of the Creation. Then again, this only goes on to show the abject shallowness and rigidity in the thinking of this author.

Conclusion

This book has very little new to offer. It is a rehash of old evolutionistic and uniformitarian shibboleths, with little evidence of any kind of substantial understanding of the creationist position. The author's undisguised hostility to creationist usage of her scientific findings alone discredits her as a serious author.

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The Missoula Flood—analogue for the greatest flood of all

Bretz's Flood: The remarkable story of a rebel geologist and the world's greatest flood

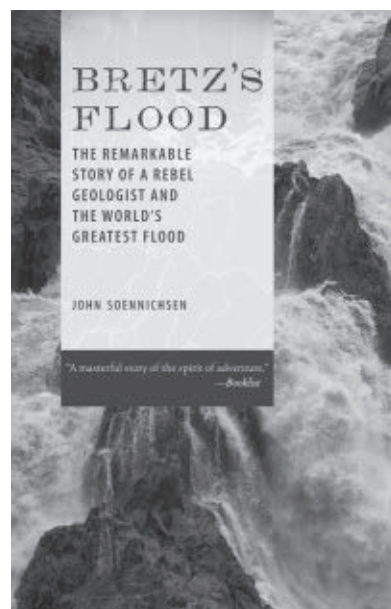
John Soennichsen
Sasquatch Books, 2009

Edward Isaacs

Harlen Bretz and his research in Washington State's Channeled Scablands have become one of the most remarkable stories in science—one of how "personalities, pride, and outright prejudice superseded scientific evidence".¹ Though told innumerable times over the past half century, few tell this story so clearly as John Soennichsen in his book *Bretz's Flood*. Through a fascinating examination of Bretz's life, Soennichsen clearly depicts Bretz's remarkable journey from the origination of his "outrageous hypothesis" to its vindication.

Bretz the atheist

Born in the late nineteenth century, Bretz was raised in a Christian home. However, Bretz observed much Christian hypocrisy such as false "faith healers" (pp. 8–9). Bretz was drawn to the sciences, and although Bretz's father was similarly interested



in science, Bretz saw the pursuit of scientific inquiry passively discouraged in his home.² These influences helped push the young Bretz to become an atheist "nature lover and worshipper" (p. 12) and "a rebel against the uncritical acceptance of Christian mysticism and mythology" (p. 10). This belief would be reinforced throughout his life through interactions with students who were unprepared "to make a defense to anyone who asks you for a reason for the hope that is in you" (1 Peter 3:15). Nonetheless, Christianity had a lasting impact on him.³



Figure 1. A panoramic view of Dry Falls. During the Missoula Flood, huge torrents cascading over 100 m off the falls eroded gigantic plunge pools and left erosional remnants (middle right), while floodwater above planed the adjacent regions.

The outrageous hypothesis

Bretz developed an interest in the Scablands as early as 1909 but did not start his lifelong research there for another decade. After meticulous observations of the region and its deep coulees (box-shaped canyons), towering cataracts, oversized plunge pools, and regional-sized braided streambeds, Bretz concluded that catastrophic stream erosion formed the Scablands (figure 1). Yet, few were willing to accept his conclusions. Calling for the use of ‘established’ geologic processes to explain the Scablands, Bretz’s critics proposed many hypotheses to contradict his catastrophism, even stating that Bretz’s flood was too biblical in scale.^{4,5} It took a new generation of geologists for Bretz’s work to be accepted, and in 1979 Bretz was awarded the prestigious Penrose Medal after enduring over 40 years of rejection.

Chronology of the Missoula Flood

What is now known as the Missoula Flood has been well researched, leading to a comprehensive chronology of events. Meltwater ponded behind an ice dam in Montana to form Glacial Lake Missoula. When the dam failed, a massive surge of water inundated the surrounding valleys, producing huge ripple marks and erosional structures formed by kolk.⁶ Upon exiting Rathdrum Prairie further downstream, the Missoula Flood emptied into Glacial Lake Columbia in present-day Eastern Washington before quickly overflowing its banks and flooding across the Columbia Plateau where the floodwater planed and scoured the basalt, carving several scabland tracts and depositing numerous gravel bars. Before entering the Quincy Basin, the Missoula Flood gouged coulees into the substrate, such as Grand Coulee, and left the large erosional remnants Umatilla Rock in Lower Grand Coulee and Steamboat Rock in Upper Grand

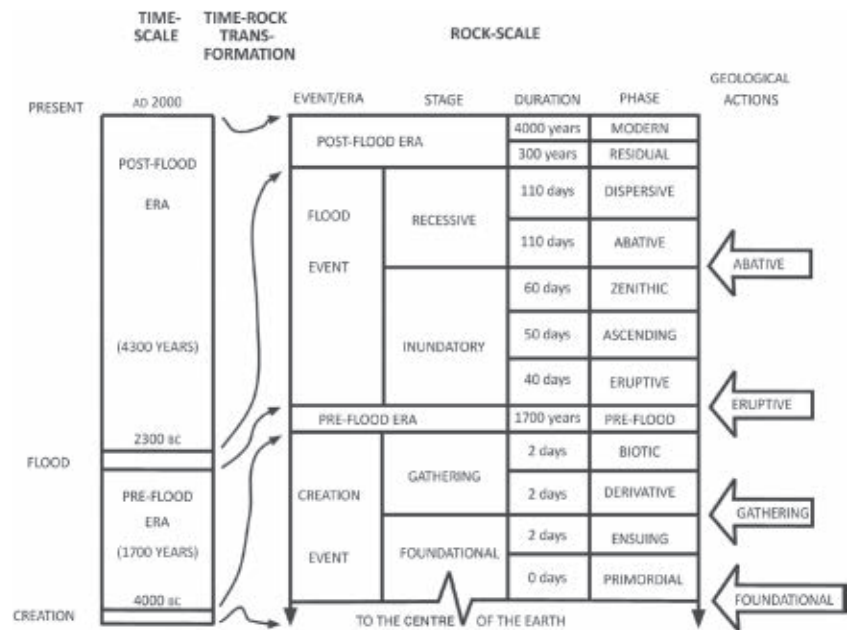


Figure 2. Walker's updated diluvial timescale of Earth history. The Flood began with catastrophic erosion and deposition as the floodwaters inundated the continents (Inundatory Stage). Later tectonics commenced the Recessive Stage and caused catastrophic sheet flow to retrocede from the continents and form regional planation and erosional surfaces. Further runoff channelized to produce localized water gaps, erosional remnants, pediments, and terraces.

Coulee as well as the monumental Dry Falls (figure 1).

As the Missoula Flood issued into south-eastern Washington and carved the Cheney-Palouse Scabland tract, it overflowed and transected the southern border of Washtucna Coulee, rapidly breaching the ridge and forming Palouse Canyon and Devils Canyon. This floodwater streamed into Idaho's Snake River, back-flooding several miles upstream and depositing gigantic gravel bars countercurrent to the present river. This branch rejoined the main torrent and briefly ponded at the Wallula Gap where it reached velocities nearing 130 km/h, bursting through the Columbia Gorge and producing terraces and boulder fields. Further west the floodwater eroded Beacon Rock, the remaining throat of an extinct volcano. Numerous hanging valleys were also produced, now containing the largest concentration of waterfalls in the United States, including Multnomah Falls.

As the Missoula Flood emptied through the Columbia River into the

Pacific Ocean, it back-flooded into the Willamette Valley where it deposited numerous erratic boulders⁷ and the enormous gravel deposits comprising the Portland Delta before finally draining into the Pacific Ocean.

How many Missoula floods?

Although Bretz originally hypothesized one Missoula flood, geologists today propose up to 100 such floods. Soennichsen noted that: "Current research has raised this total to forty, sixty, eighty—even a hundred floods or more" (p. 251). The multiple Missoula floods are based on an interpretation of rhythmites,⁸ usually presuming one rhythmite per flood. Bennito and O'Connor admit: "We *infer* that each sand and gravel couplet [rhythmite] was deposited during a single flood" (*italics added*).⁹ However, multiple rhythmites may be formed during a single flood, and the lack of cut-and-fill structures and angular unconformities in Walla Walla Valley rhythmites indicate a single gigantic Missoula

flood.^{10,11} Clastic dikes transecting the entire sequence of rhythmites exposed in Burlingame Canyon reinforces this interpretation.^{10,11} Some geologists are now returning to Bretz's original hypothesis of one gigantic Missoula flood.¹²

Soennichsen on diluvial geology

In examining Bretz's legacy, Soennichsen says:

"... another sort of theorizing has occurred ever since Bretz's theories first gained acceptance. Over the past few decades, in fact, Bretz has gained a whole new collection of allies composed of individuals with decidedly *unscientific* viewpoints. These are people who are elated to see catastrophism winning out over uniformitarianism. They are the proponents of creationism, people for whom Bretz has suddenly become a hero who—in their minds—single-handedly proved their case for the Great Flood in the Bible" (p. 260).

He further adds that:

"Dozens of creationist books, magazine, articles, and Web sites [*sic*] now portray Bretz as a champion who advanced the theory of creationism by refusing to bow down to his uniformitarian colleagues. But while the results of his findings may serve their purpose, nothing could be further from the truth than Bretz embracing catastrophism. ... Bretz was no poster boy for creationism" (p. 261).

Soennichsen shows himself to be a master of the strawman argument. First, he claims that the debate on diluvial geology is one of 'science vs religion', not discussing the philosophy underlying secular geology.^{13,14} Second, he falsely claims that diluvialists believe Bretz "proved their case for the Great Flood in the Bible".¹⁵

A broader perspective—the Ice Age

The Pleistocene Ice Age presents some of the greatest enigmas to secular

geology,¹⁶ such as the absence of a plausible mechanism.^{16–20} An ice age requires: 1) greater atmospheric moisture for increased snowfall; 2) cooler summers and reduced solar input; and 3) an extended period of these conditions for glaciation.¹⁶ Secular geology cannot explain these seemingly contradictory conditions because they are a natural consequence of the Genesis Flood.¹⁶ Following the Flood, temporarily elevated ocean temperatures fuelled profuse snowfall over the continents while the addition of aerosols to the atmosphere via subsiding volcanism reduced solar radiation, thereby cooling Earth's atmosphere.¹⁶ This condition would continue for centuries as the earth regained tectonic and volcanic equilibrium and the oceans cooled.¹⁶ Subsequent deglaciation produced numerous meltwater streams which often ponded behind ice dams from local glaciers. Many of these lakes were eventually released as large meltwater floods like the Missoula Flood.²¹

Missoula Flood—analogue for the greatest flood of all

Bretz's critics vehemently opposed the scale of the Missoula Flood. Soennichsen notes that the Scablands: "formed deep below the surface of the flood waters, sometimes hundreds of feet in depth" (p. 229). The immensity of the Missoula Flood makes it a local analogue of the cataclysmic erosional and depositional processes operating during the Genesis Flood. Walker's timescale²² (figure 2) depicts rapid erosion and sedimentation during the inundation of the continents (the Inundatory Stage), followed by catastrophic sheet flow concomitant to rising continents during the Recessive Stage producing regional-scale planation and erosional surfaces like those in the Teton Mountains (Wyoming) and the lower-elevation Colorado Plateau.²³ More localized run-off created water gaps, erosional remnants, pediments,²⁴ and terraces.^{23,25}

Conclusions

Soennichsen details the truly remarkable story of J Harlen Bretz, clearly depicting the life and work of this astounding man. However, Soennichsen dismisses the debate on diluvial geology as being one of 'science vs religion' and fails to observe the shortcomings of secular geology. Instead, the Missoula Flood is an excellent analogue for the Genesis Flood and provides insights into the erosional and depositional processes operating during the greatest Flood of all. Bretz's story also exemplifies the bias conventional geology holds against any event resembling the Genesis Flood, for they are indeed willingly ignorant.

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- This is illustrated by Bretz's recollection of his grandfather and his position on science: "Why argue about scientific theories when the Bible contains all we need to know in order to get a pass to heaven?" (p. 8).
- For example, even as a firmly committed atheist he would still recall familiar Bible verses upon occasion.
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- An erratic is: "A rock fragment carried by glacial ice, deposited at some distance [often up to hundreds of km] from the outcrop from which it was derived, and generally resting on bedrock of different lithology." Bates, R.L. and Jackson, J. A., (Eds.), *Dictionary of Geological Terms*, 3rd edn, Anchor Press, New York, p. 170, 1984. Many erratic boulders in the Willamette Valley were glacially rafted on icebergs before being deposited during the Missoula Flood.
- A rhythmite is an "individual unit of a rhythmic succession" resulting from: "The repetition, through a sedimentary succession, of a sequence of two or more rock units in a particular order and indicating a frequent and predictable recurrence of the same sequence of conditions. It may involve only two components (such as interbedded laminae of silt and clay)." Bates and Jackson, ref. 7, p. 432.
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A book about human errors that don't exist

Human Errors: A panorama of our glitches, from pointless bones to broken genes

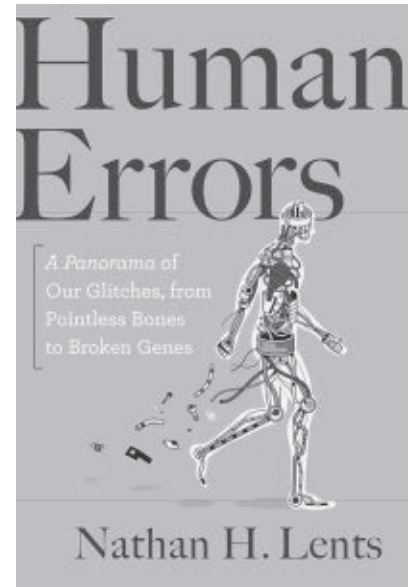
Nathan H. Lents

Houghton Mifflin Harcourt, Boston, MA, 2018

Jerry Bergman

It is the responsibility of an author to do basic research before writing a book. I have read few books with as many gross errors as this one, mostly in chapters 1, 3, and 4. Although entertaining and well-written, most of the examples in these three chapters are incorrect or not up to date. One example of many is the so-called placement of the retina photoreceptors called backward because they face away from the source of light instead of toward it (pp. 2–8). A major reason for this design, as has long been known to ophthalmologists,¹ is that both the rods and cones must physically interact with the retinal pigment epithelial (RPE) cells, which are located at the back of the eye. The RPE provides nutrients and oxygen to the retina cells, one of the most bioactive cell systems in the body.

The RPE also recycles photopigments and its opaque layer absorbs excess light. It is even essential in both the development and the normal function of the retina. The reverse would not work. Lents cites the octopus as an example of good design only because its photoreceptors face the front of the eye. In this case, the equivalent RPE system is located on each side of the rods and cones, not in the back of them as is true in



humans. The octopus system is less sensitive, but works because their vision is sensitive mostly to movement in a fairly dark underwater world. Lents is also evidently unaware how the arrangement allows the light to be filtered through a fibre optic plate comprising the Müller glial cells. This plate filters out stray light, increases image sharpness,² and separates the colours to optimize day vision without harming night vision.³

The recurrent laryngeal nerve

Another example Lents cites is the recurrent laryngeal nerve (p. 14) which he argues is much longer than required because, instead of travelling directly to the larynx, it loops around the aortic arch then travels back up to the larynx. The superior laryngeal nerve is not one nerve that has one function as implied by Lents and others, but has several functions. It divides into branches which control

the internal laryngeal muscle, and innervate muscles responsible for pitch, controlling loudness, and vocal fatigue. The three main branches of the recurrent laryngeal nerve innervate several muscle bundles including the thyroarytenoid muscle, the posterior cricoarytenoid muscle and the lateral cricoarytenoid muscle. We know this because damage to the nerves that innervate these muscles affects articulation, causing speech to be ‘slurred’ or ‘garbled’. The existing recurrent laryngeal nerve system design serves to make fine adjustments to larynx control in order to improve speech quality.⁴

Other examples Lents discusses include the upside-down maxillary nasal sinuses which he claims are poor design because they often must drain *against* gravity. They are located behind each upper cheek above the teeth, one on each side of the nose (pp. 12–13). Given their many functions, which include lubricating, warming and moistening the air we breathe, the nasal sinuses must be designed to completely surround the nasal cavity. All the paranasal sinuses produce resonance to allow each human voice to be so unique that voice analysis can often accurately identify persons that make phone threats.

The maxillary nasal sinuses use cilia to move the sinuses’ contents upward, and the main problem is when they become inflamed, which causes problems for all of the paranasal sinuses. The maxillary nasal sinuses are only upside down when humans are sitting up or walking. When lying down, they have the advantage of gravity helping to drain them, but the other paranasal sinuses have the disadvantage the maxillary sinuses have when the person is standing upright.

The poor knee design claim

The injury-prone knee (pp. 32–33), which Lents also cites as an example of poor design, is not injury prone as a result of poor design. Almost all knee problems are due to body abuse, overuse, injury, or disease, and not poor design. The knee is the largest, most complex joint in the human body, but it is also one of the most used (and abused) body joints. It is also considered a marvel of engineering and design by engineers. Furthermore, no evidence exists of knee evolution in the abundant fossil record. Mammals either have the irreducibly complex human type of knee,⁵ or the simpler non-human type.

The herniated disk and other back problems he mentions (p. 26) do not result from poor design or maladaptation because bipedalism was superimposed by evolution on a skeleton previously well-adapted for quadrupedal motion as Lents claims. Rather, it is caused by abuses of the body that are common in modern life. This includes lack of exercise, poor posture, stress, and being in unusual positions for long periods of time, such as bending forward on an assembly line while working or spending hours on a computer. In short, anything that *decreases* the natural and well-designed lordosis (backward curve) causes problems, the opposite of the Darwinism-based approach.⁶

The too many bones claim

Next covered are claims of foot and hand problems caused by too many bones (p. 29). Lents claims human feet comprise 26 bones because we evolved from ape-like ancestors that required flexible feet to grasp branches. Thus, humans have an excess number of foot and hand bones because we no longer are arboreal (p. 29). However, the current design allows the human foot and hand to be more flexible, to our advantage in many obvious ways, than would be the case if the hands and feet had fewer bones as advocated by Lents.

The claimed birthing problem

The last example mentioned is the claim that birthing problems commonly result because the female birth canal size has not significantly evolved since our ape common ancestor, but the human head has evolved significantly since then (pp. 106–107). Actually, this is rarely a problem. The birthing system’s design ensures that almost all healthy mothers birth without problems except the birthing pain mentioned in Genesis due the Eve’s sin. These

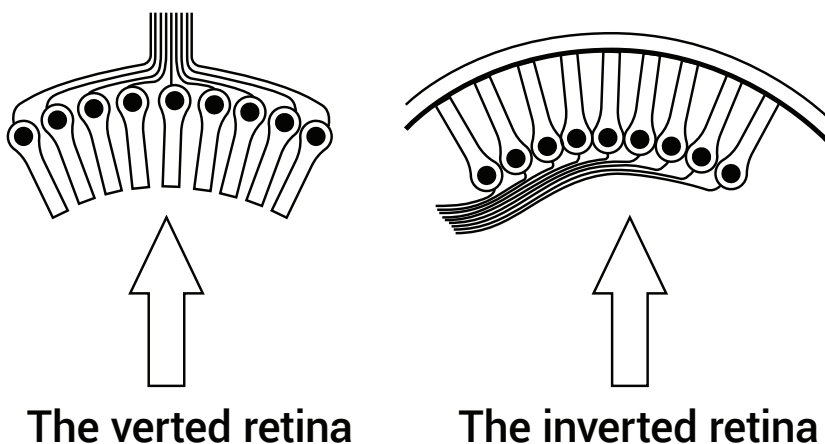


Figure 1. The verted and inverted eye. The latter is used in humans and is incorrectly referred to as the backward retina. Arrows indicate the direction of incident light.

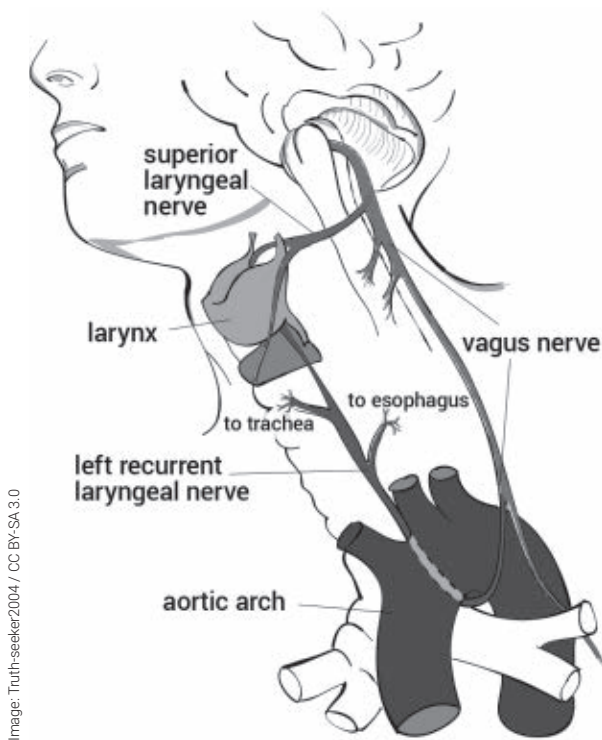


Image: Truth-seeker2004 / CC BY-SA 3.0

Figure 2. The recurrent laryngeal nerve looping around the aortic arch and then proceeding upward toward the larynx.

mechanisms include a pelvis consisting of two large hip bones that meet at the front of the body connected together by a fibrous joint composed of dense connective tissue. During pregnancy, a hormone called *relaxin* causes this joint to become more flexible, allowing the birth canal opening to significantly increase in size to permit a healthy mother to birth the baby with very few complications.

The skull of the newborn is also fairly flexible and, in almost all cases, able to conform to the birth canal opening. An infant's skull is made up of six separate cranial bones held together by strong, fibrous, elastic sutures. The flexibility of the sutures allows the bones to move to enable the baby's head to pass through the birth canal without pressing on, and damaging, the brain.

Any internet search will reveal that Lents is quoting Darwinists who are not anatomists, nor up to date. As Stephen Jay Gould noted, once a

for good health. He cites the fact that cows can thrive on a diet largely of grass and do not need a "delicate mix of legumes, fruits, fiber, meat, and dairy like humans are told to eat" (p. 36). One example is vitamin C. Aside from fruit bats, guinea pigs, primates, and humans "nearly all animals on the planet make plenty of their own vitamin C, usually in their liver" (p. 38). Lents explains that humans have the genes required to manufacture vitamin C except for what he calls a "broken gene", namely the GULO gene.

Mutations are not evidence of poor design

This condition, of course, is not a result of poor design, but due to one or more mutations, as are the other 6,000 or so mutation-caused diseases. And this would be expected from the Fall, something which Lents ignores—as do most 'poor-design' propagandists.

wrong idea becomes part of academia, it may take a long time to remove it. Haeckel's fraudulent embryos took almost a century before they were finally largely, but not completely, removed from the text books.

Chapter 2 covers nutrition, which is not an example of poor design but how medicine deals with health problems. Lents notes that most animals' diets are controlled by instincts and, in contrast to humans, can make most of the amino acids and vitamins required

This is the opposite of evolution where mutations are ultimately the only source of genetic variety that natural selection uses to improve an organism's fitness.

Some of these mutation-caused diseases, such as phenylketonuria (PKU), can be treated by dietary modifications. In this case, the body cannot metabolize the amino acid phenylalanine into the amino acid tyrosine. Persons with this genetic disease, which often used to be fatal, can do very well with dietary modifications, including major reductions of foods high in phenylalanine, mostly high-protein foods such as dairy products, red meat, fish, chicken, eggs, certain beans, and nuts. These foods cause high blood phenylalanine levels which are toxic to the nervous system for people with the PKU mutation.

Lents also inadvertently undermines evolution from simple one-celled organisms to the higher, complex organisms such as primates when he notes that many animals located on the base of the phylogenetic tree can make all 20 amino acids normally required, whereas humans can make only 11, and likewise many simple organisms can make all of the vitamins they require, yet in humans there are 13 vitamins called 'essential', meaning they must come from our diet.

Actually, vitamins K and B₁₂ are made by bacteria in our colon, but are poorly absorbed there. Lowly bacteria, but not the higher plants or animals, possess the complex set of enzymes required for B₁₂ synthesis. Vitamin K is a necessary cofactor for prothrombin and certain other blood clotting factors. The same is true of other vitamins.

These complex organic compounds are manufactured at the base of the food chain in the lower, supposedly simple animals, and they move up the food chain into the higher-level, more-evolved animals. If humans could obtain a perfectly healthy diet, due

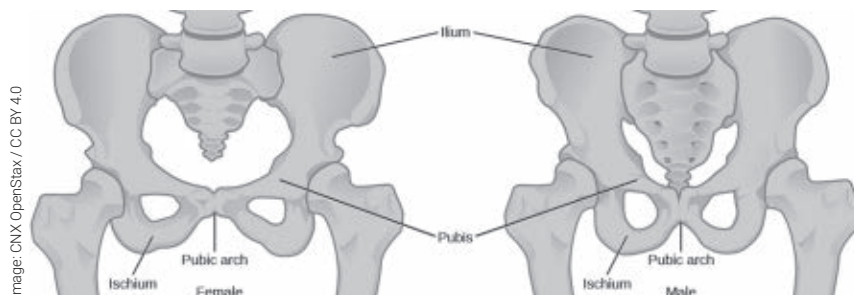


Figure 3. Comparison of the female and male pelvis. Note how much wider the female pelvis is.

to our bacterial biome, by consuming grass alone, this would if anything support the plausibility of a pre-Fall vegetarian diet. Nonetheless, today we require a complex diet, possibly as an end result of the Fall.

Lents' review of mutations includes noting that many germ line "mutations are harmful because they disrupt the function of a gene" and the "poor offspring that inherit a gene mutation from their father or mother are almost always worse off for it ... but sometimes the harm that a mutation brings is not immediate" and these mutations, if they do not result in human or animal "short-term loss in health or fertility, it won't necessarily be eliminated. ... If this mutation caused harm only far down the road, natural selection is powerless to immediately stop it" (p.71). Lents calls this evolution's blind spot, correctly noting "the human genome contains thousands of scars from harmful mutations that natural selection failed to notice until it was too late" (p. 71). This is not a result of poor design, but damage caused by mutagens.

The pseudogene claim

The discussion of pseudogenes, which he defines as "once-functional genes that became mutated beyond repair," ignores the finding that many of these once misnamed pseudogenes are now known to have a function. The number he gives is "nearly twenty thousand" (p. 73). In answer to the

question of "why nature wasn't able to fix this problem the same way it created it: through mutation," he answers:

"That'd be nice, but it's nearly impossible. A mutation is like a lightning strike The odds of lightning striking the same place twice are so infinitesimally tiny as to be nonexistent. What's more, it's exceedingly unlikely that a mutation will fix a broken gene because, following the initial damage, the gene will soon rack up additional mutations" (p. 72).

If the odds of repairing a damaged gene are so infinitesimally small, what are the chances of creating a functional gene from random letters, or even converting one gene into another as evolutionists postulate? Here again, he has documented the reasoning behind the mutational degeneration idea creationists support based on evidence. Lents here supports the view that evolution is true, but is going backwards, which is a major problem for Darwinism. Lents does not even try to defend the orthodox evolutionary view that the accumulation of mutations causes evolution from molecules to mankind, but just assumes it is true.

Junk that is not junk

Chapter 3 on Junk in the Genome repeats the long-refuted arguments that only a small percentage of DNA is functional. The junk is theorized to be left over from our evolutionary

past, or was once functional, but was damaged as we evolved from lower life forms. On the very first page of this chapter, Lents admits that the term junk has fallen out of favour due to the discovery of functions for "some parts of this junk" (p. 65). Lents also admits "it may very well turn out that a large portion of so-called junk DNA actually serves some purpose", a statement that is totally ignored in most of the rest of this chapter (p. 65). It appears that after Lents wrote this chapter, he became aware that many of the conclusions by evolutionists have turned out to be wrong, thus he rewrote the first page, but left the rest of the chapter alone.

An example is on page 67 where he notes we have 23,000 genes and asks what does the rest of the DNA do? His answer: "nothing" (p. 67). He then adds that only 3% of the genome consists of words, the rest is "gobbledygook", i.e. junk! (p. 67). He also writes that the 23,000 useful genes that make up 3% of the genome "are a wonder of nature" but most of the "other 97 percent of human DNA is more of a blunder Some of it, indeed, is actually harmful" (p. 69). Last, he adds that "over a million cell divisions per second" occur each day, and each "one of those cell divisions involves copying the entire genome, junk and all ... just to copy your largely useless DNA." He concludes, given "all of the nonsense encoded in the human genome it's surprising that we turned out as well as we have."

Lents' book was released 1 May 2018 and had glowing reviews from many leading evolutionists and atheists. Long before this book was published, the Encyclopedia of DNA Elements (ENCODE) research project was commenced. Its goal is to identify the functional elements in the human genome. It began in 2003 and is now in its 4th phase. So far, the 440 scientists from 32 laboratories worldwide have determined that 80% of the genome is useful, often for regulatory functions.

The central conclusions from the pilot project were published in *Nature* on June 2007, a decade before Lents' book was published. Lents either ignored this research or was not aware of it.

Lents admits the 'evolutionary' DNA design is "a simple but ingenious form of information coding, especially because it makes it very easy for genetic material to be copied again and again ... a miraculous feat of evolutionary engineering but also the base of our very existence" (p. 66–67). This is only one of many examples where Lents informs the reader how evolution is intelligent, miraculous, ingenious, and other terms applying to sentient beings.

Lents unwittingly includes many other arguments against evolution in his book. For example, he notes:

"... even though humans have been evolving separately from some mammals for over a quarter of a billion years, we all have the same number of functional genes. In fact, humans have roughly the same number of genes as microscopic roundworms, which have no real tissues or organs" (p. 68).

My response to Lents' claim is that the difference between the lower, simpler and higher more complex animals, is not primarily due to the functional genes but rather to the regulatory genes that Lents calls 'gobbledygook'.

Birthing problems claim

Chapter 4 covers topics such as "why our enormous skulls force us to be born way before we are ready and humans have the lowest fertility rate and the highest mortality rate for infants" (p. 92). Human families have low fertility rates because all primates but humans, and all animals, are largely governed by inborn instincts. Humans require years before they can assume adult roles; most primates require only months. Furthermore,

many families used to have eight, 10, or more children largely to ensure that some survived. The human mortality rate has been reduced enormously by cleanliness, antiseptic measures, vaccination, antibiotics, and even simply washing one's hands before helping with delivery has seen a significant improvement as Semmelweis discovered.

Chapter 5 reviews the innovations provided by modern medicine, including antibiotics. Lents fails to show how the medical problems covered in this chapter are due to poor design. Lents admits that infectious diseases and most of the other medical concerns he covers are not design flaws, but "are our own fault, not nature's" (p. 129). He notes the most common ailments in the West are head colds and gastroenteritis, both reduced by proper cleanliness and a good diet (p. 127). Much of this chapter, as well as chapters 2 and 4, are mostly about disease cause and treatment.

Chapter 6 covers the brain and mostly describes its quirks such as optical illusions, the tendency to take risks, memory distortion, and behaviour such as smoking, drug use, and gambling. Lents acknowledges in some detail the fact that the human brain is an amazing structure, adding the fact that even "modern supercomputers cannot compare to the fast and nimble capabilities of the human brain. ... but also in its ability to self-train" (pp. 157–158). None of these examples illustrate poor design but mostly poor judgement on the part of many persons. The chapter relies heavily on the work of New York University psychologist Gary Marcus.⁷

Conclusion

The stated goal of Lents is to document the poor design claims in the human body, but he fails miserably. Only three chapters directly attempt to achieve this goal, chapters 1 and 3 and

parts of 4. Chapter 3 has been carefully rebuked by extensive new research, including the ENCODE project. The claims by Darwinists given in Chapters 1 and 4 have likewise been refuted by empirical research, by both evolutionists and creationists.

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Mankind undone: the evolutionary identity crisis

***The Human Instinct:
How we evolved to have reason,
consciousness, and free will***

Kenneth R. Miller

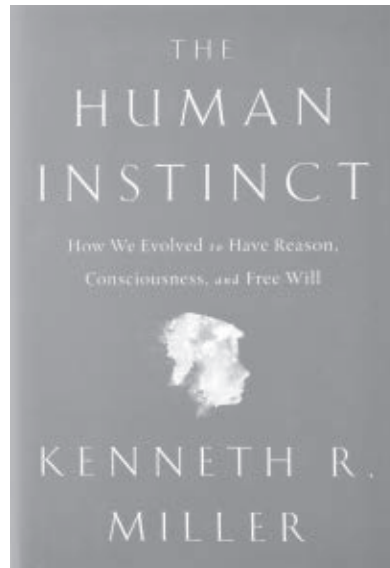
Simon & Schuster, New York, 2018

Keaton Halley

Is evolution bad news for mankind? Even some evolutionists answer, ‘yes.’ Along with creationists, they recognize that evolution is derived from a naturalistic worldview, which ends up subverting vital elements of the human experience. In particular, the evolutionary perspective threatens our significance, purpose, religion, morality, reason, consciousness, and power of voluntary choice. Yet, evolution popularizer and textbook author Kenneth Miller aims to challenge this negative outlook, insisting that evolution can, in fact, endow us with these human distinctives. He goes so far as to claim that evolution is “the best news we have ever received about the world and our place in it” (p. 26). However, Miller’s attempts to rescue humanity from the repercussions of his own evolutionary framework simply do not succeed.

Miller’s materialism

The fundamental problem with Miller’s approach is that he leaves God out of the discussion. His argument is that human exceptionalism can be derived from nature alone. Though he claims to be Roman Catholic,¹ in this book Miller studiously avoids invoking God as the explanation for anything, and indeed contradicts Catholic teaching on many points.



Instead, Miller personifies nature as a God-substitute, attributing goals to “the universe” (p. 80) and plans to “life” (p. 52).

He is quite dismissive of the Bible as well, and says it is of no consequence if parts of the Bible are untrustworthy (p. 203). Indeed, Miller claims that the Bible is wrong when it implies a recent origin of mankind (p. 53). This at least makes a refreshing change from many in the church who go to great lengths to argue that Genesis does not actually mean what it so plainly says.

Miller also insists that humans are composed of matter alone (pp. 216–217), ignoring the Bible’s teaching about an immaterial part of us that survives physical death. Despite his cavalier attitude, however, God and the truths revealed in His Word (e.g. the *imago dei*) are the very foundation for the human attributes Miller is attempting to defend. Thus, Miller’s project cannot succeed as long as he ignores God and the spiritual realm.

Evidence

Before pursuing his primary thesis, Miller could not resist devoting a chapter to defending evolution itself. In characteristic fashion, though, Miller’s overconfidence and rhetoric run far ahead of the strength of his arguments.

He begins with hominin fossils, and his approach is two-pronged. First, he attempts to document a progressive growth in cranial capacity through time. Second, he cites conflicting interpretations of hominin bones by creationists. But, as Miller’s expertise is in cell biology, it feels as if he is a bit out of his element when dealing with fossils, and he handles the evidence less rigorously. For example, given the range of brain sizes and skull morphologies within the genus *Homo*, and even within living humans, Miller is wrong to assume that creationists would predict a clear ‘gap’—with no overlap—between apes and humans based on a mere handful of morphological characters (p. 36–38). The tidy picture he presents relies on limited data sets and non-diagnostic criteria. It also ignores the messier reality of additional variables such as the brain’s organization and postcranial bones, as well as the evolutionary bias in reconstructing skeletons and assigning dates.

As for conflicting creationist claims, why should this prove anything more than the immense difficulty of piecing together the distant past based on fragmentary remains to which creationists have no direct access? Frankly, if disagreement among researchers brings down the entire paradigm, then evolution doesn’t stand a chance either.

Next, Miller triumphantly highlights shared pseudogenes as undeniable proof of common ancestry. Of course, he neglects to inform readers of his equally certain yet *failed* prediction in exactly this area, regarding the now known-to-be-functional beta-globin pseudogene.² So, why should we trust that Miller’s latest examples—the egg

yolk pseudogenes (pp. 40–43) and NANOG pseudogenes (pp. 44–47)—are truly functionless genetic junk? In a subsequent chapter, Miller chides evolutionary psychologists for frequently leaping to conclusions before the science is fully understood (pp. 113–114). It's a pity he doesn't apply that same caution to his claims about 'junk DNA', because the scientific momentum is not working in his favour.

Miller also doubles down on his earlier claim that human chromosome 2 was derived from the fusion of two ape chromosomes (pp. 47–50, 231–239).^{3,4} However, he fails to appreciate that, even if true, this fact would merely show that the *human* lineage experienced a fusion event since no apes possess the fused chromosome.⁵ Granted, this would add one more similarity to the many already documented between humans and apes, and hence it would qualify as a fulfilled, though weak, prediction of evolution—that apes and humans once had even more in common. But similarities may be best explained by common design, so it would still be a huge leap to demand ape ancestry as the correct implication of a fusion. Still, despite Miller's tenacity, strong evidence is mounting that there was no fusion event at all—including the fact that the alleged cryptic centromere is, like the alleged fusion site, located within an active gene.⁶

Significance

As Miller returns to his main thesis in chapter 3, he tries to show that humans can have value, meaning, and significance despite our evolutionary heritage. Miller's argument is as follows. Yes, evolution refuted the traditional, biblical understanding of a recent, supernatural origin of humanity. Yes, evolution tells us that we belong to the animal kingdom and not to a *sui generis*. Yes, evolution says that we are not biologically

privileged above other species. Yes, evolution demonstrates that chance played a major role in bringing about our existence, and thus we were not designed or predetermined with any high degree of specificity (p. 75). Nevertheless, because evolution works by endlessly exploring the options permitted by natural laws, the possibility of an intelligent, social, self-aware organism eventually turning up could have been 'baked in' from the beginning (p. 77). Plus, our ability to explore and comprehend the universe is remarkable whether or not this was the goal, so these facts should lead us to view ourselves as significant and assign our own meaning to life (p. 226).

However, this reasoning faces serious problems at just about every step. Without space to address all the issues here, it is important to touch on just a few. First, one mistake that Miller makes repeatedly in this book is to assume that evolution gave us the world as we know it without recourse to any supernatural causes, and to build his argument from that faulty premise. Since, in the world as we know it, humans do have significance, from these two premises it would follow that naturalistic evolution gave us a world with significance. But that begs the question. The real question is not, 'Do we have significance assuming naturalistic evolution produced this world?' but, '*Would* we have significance in any world produced by naturalistic evolution?' Miller fails to address the latter.

Second, Miller equivocates between objective and subjective truth when discussing value, meaning, and purpose. He spends many pages trying to convince us that we are significant, which implies an objective truth, not just his personal preference. Yet, in the end, he tells us, "we ... define the meaning of our lives" (p. 228). But if the meaning of our existence is only in the mind of Miller, there is no reason we must adopt his

arbitrary perspective. By turning our significance into a private affair, Miller has undercut his own project.

Third, our metaphysical status hinges on the question of teleology, but Miller says that we were not preordained (p. 69). Worse, he is noncommittal on the question of whether God even intended to bring about something *like* human beings. He says: "Whether the consciousness, reason, and awareness displayed by human beings are the *telos*, the goal of the universe, I cannot say" (p. 80). Logically, if we were unintended byproducts of a blind process, our lives would not have objective purpose or meaning. And no amount of self-assigned meaning would rescue us from that disturbing fact. Of course, this is contrary to the biblical teaching that God's handiwork is obvious in nature (Romans 1) and that human beings were foreordained in specific detail from the foundation of the world.⁷ But Miller simply ignores the heart of the issue by sidestepping questions about God's involvement.

Morality and religion

In chapter 4, which deals with evolutionary explanations for human behaviour in general, Miller argues that it is not possible to reduce all behaviour to explanations involving evolutionary psychology and sociobiology. Though he claims evolution has definitely given us certain behavioural instincts, he says it has also given us the ability to transcend those instincts. Thus, our moral and religious activities "rise above" our evolutionary past (p. 114).

The problem here is that, again, Miller refers to what *is* rather than asking what *would be* if his metaphysical commitments were true. Miller may be a theist, but he never met a feature of human beings that he thought was incapable of being explained by naturalism. As he himself admitted: "In this book I bring up religious faith very little. I'm trying to

make a purely scientific argument.”¹ But how can Miller derive a moral ‘ought’ from a scientific ‘is’? If humans have an exclusively physical origin and physical inner workings, how is it possible to “rise above” our physical nature in order to reach the spiritual and deontological?

As Miller correctly points out, it is self-refuting to say that science shows all behaviour to be just the mechanistic outworking of impersonal forces. If we were mere automatons, Miller says, science would not even be possible. True, but Miller does not explain how we escape from the naturalistic cage he has imposed on us. All he has done is to show that a naturalistic evolutionary account of human beings leads to absurdities. The right course of action, then, is to abandon naturalistic evolution, not to assume that it can give rise to objective morality and knowledge of the true God after all. These theological concepts are inconsistent with Miller’s starting point.

Reason

Miller’s next chapter discusses whether evolution could endow humans

with minds reliable enough to reason properly and do science. Miller says that although our rational faculties are rooted in our physical brains alone (with no immaterial component), and although our brains are kludgy and prone to error thanks to their evolutionary origin, rational thinking must arise from the complexity of the organization in our brains. After all, Miller says, to reason our way to a denial of reason would be a self-contradiction.

Once again, however, Miller begs the question and avoids the central issue. Nobody who argues, as I have, that evolution cannot account for our rational faculties is suggesting that we should therefore doubt those faculties. Rather, it is because we are confident of those faculties that we should doubt evolution.^{8,9} So, for all Miller’s posturing, he has made no headway toward explaining how blind physical processes could endow material brains with the capacity to reason. He just takes it for granted, employing the classic question-begging argument: ‘Evolution must have made it because it’s here.’

A variety of other problems plague this chapter as well. For example,

Miller wrestles with Alfred Russel Wallace’s argument that evolution cannot explain the exceptional powers of the human mind. The problem is that our minds are capable of feats far beyond those that should have been sufficient for our ancestors to pass on their DNA. Miller responds that not all products of evolution are necessarily the result of direct selective pressure. Rather, using Gould and Lewontin’s analogy of architectural spandrels (triangular spaces formed as byproducts of connected arches), Miller insists our astonishing mental capabilities could be mere spin-offs of adaptive forces. Yet, this essentially means that Miller is invoking pure luck to explain our most remarkable abilities. Is this really an explanatory advance on the idea that our intellectual endowments were favoured by selective pressure? By invoking spandrels, Miller has actually abandoned what is most persuasive about neo-Darwinism—its non-purely-random character.

Consciousness

Next, Miller maintains that consciousness need not be grounded in anything more than matter, and somehow emerges from higher levels of physical complexity. He says: “Let’s assume the obvious, which is that human consciousness is a product of the workings of our nervous system as it interacts with the rest of the body and with the outside world” (p. 150). But this is far from obvious! Again, Miller offers blind faith in place of evidence for his physicalist viewpoint.

He makes several other serious mistakes in this chapter as well. First, after elaborating on how blind children can produce a sensation of light (phosphene) by putting pressure on their eyes, Miller concludes: “Sensations are physical events” (p. 157). This does not follow. Dependence, causation, and even necessary correlation are not the same as identity.

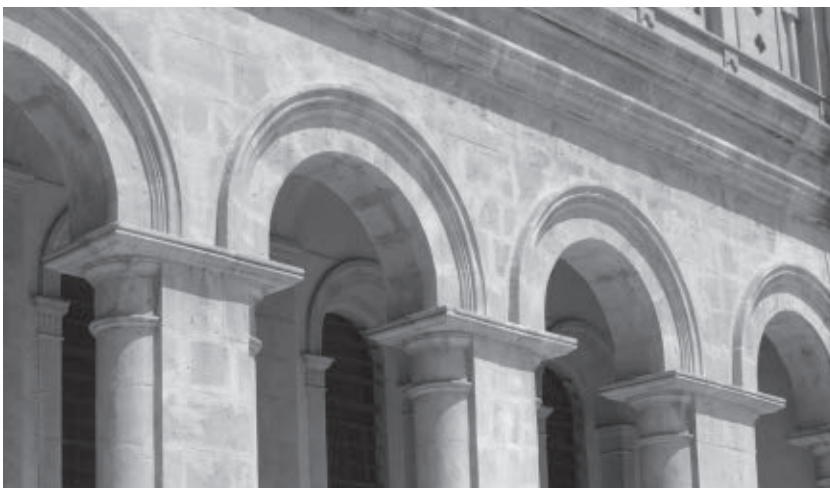


Figure 1. Architectural spandrels are roughly triangular spaces between arches. In a famous 1979 paper, Stephen Jay Gould and Richard Lewontin applied the term ‘spandrel’ to evolutionary biology. Thus, a biological spandrel refers to a characteristic that arose not through direct selection, but as a byproduct of selection for some other adaptive characteristic. Miller argues that the most impressive abilities of the human mind are spandrels (byproducts), rather than adaptive features.

For instance, the property of being triangular (three-angled) is always conjoined with being trilateral (three-sided), yet these properties are not the same. Similarly, sensations may be produced by and constantly conjoined with physical events, yet they themselves are not physical events.

Second, Miller says that nowhere in the body's operation is there room for any non-physical cause to act. The brain and body are known to operate according to the laws of physics, and therefore nothing immaterial can be exercising any causal power (p. 165). But this conclusion is too hasty. Defenders of mind/body dualism have argued, first, that there are possible ways for a soul to influence a body without necessarily adding energy.^{10,11} Second, much neuroscientific work actually presupposes the causal closure of the physical rather than openly investigating the question. Third, if souls do add energy to the system, they could do so in subtle ways very difficult to detect.¹² So, once again, Miller's argument really amounts to little more than the presumption of materialism.

Miller's next claim is that the marvel of biological life presents an apt analogy for consciousness. Looking at the building blocks of life—physical laws and particles—Miller says that none of these raw materials are themselves alive, and it would be hard to predict that such simple parts could produce the phenomenon of life, starting from the ground up. And yet, he says, they do. Life needs no ghost in the machine. Rather, being alive is something that matter does when in suitably complex arrangements. So Miller insists that consciousness could likewise be achieved by the appropriate kind of material complexity.

While I agree that the existence of biological life is a function of properly arranged matter, why think this is analogous to consciousness? By contemplating the gap between a random pile of atoms and the

constitution of a biological organism, one can intuit that the difference is a matter of arrangement and thus one of degree. Consciousness, on the other hand, exhibits a difference in kind. There are good reasons to think it is a new category of thing that can never arise by rearrangements of matter, no matter how complex. Unfortunately, Miller does not address the philosophical reasons why consciousness must be irreducibly non-physical. He does raise one such issue—from Thomas Nagel's famous essay, "What is it like to be a bat?"¹³—but never offers an answer! Nagel's point is that physicalist approaches have made no inroads toward explaining a key feature of consciousness—that of subjective, felt experiences. I would go further and say that no physical arrangement of mere matter could, in principle, have felt experiences. A felt experience is the sort of thing that can only be had by a non-physical subject.

In addition, many conscious states are intentional (*of* or *about* things) while material states are not.¹⁴ Physicalism cannot account for the unity of a personal self or the sameness of a self over time.¹⁵ And physicalism cannot account for libertarian free will¹⁶—a problem with which Miller does at least attempt to wrestle, in his penultimate chapter.

Free will

On this subject, Miller displays confusion. He is ambivalent about whether humans truly have free will or are merely deluded into thinking that we do. Nevertheless, he is certain that "you will find evolution right at the center of any explanation of free will, whether genuine or illusory" (p. 199). But his arguments fail to demonstrate this conclusion.

When presenting a case *against* free will, Miller says: "every action has to have a cause, and if our own actions do have such causes, then our will

cannot possibly be free" (p. 178). But this gratuitously assumes that *event* causation is the only kind of causation in existence, ignoring the reality of *agent* causation.

On the other hand, when arguing *for* free will, Miller says that quantum physics refutes determinism, and this opens up space for human freedom to emerge from higher levels of physical complexity in our brains. I will overlook the question of whether quantum indeterminacy is truly ontic or merely epistemic. Assuming that contingency is objectively real, it still doesn't settle the question. Miller even acknowledges that contingency is only a necessary condition for libertarian free will, not a sufficient condition (p. 188). But why then should we accept Miller's claim that true freedom can arise from some combination of chance and necessity? Free agents act for teleological reasons, so their free acts are a *third category*. We have no reason to expect they will turn out to be reducible to a mixture of randomness and determinism.

Miller goes on to describe scientific research that attempts to make progress toward grounding free will in the physical realm. But these projects inevitably either deny true freedom or smuggle the notion of 'choice' in the back door. In the end, the evidence indicates that we have freedom, but Miller has failed to identify a physical basis for it.

Conclusion

Although Miller is to be commended for his desire to shield humanity from despair, he is unable to do so because he is leaning on a broken reed. Evolution cannot offer us dignity. It fails to ground our significance, purpose, religion, morality, reason, consciousness, and free will. For each of these sublime traits we must look not to nature, but to our all-wise Creator.

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A rather pro-evolutionary author who mischaracterizes evolutionary transitional forms

The Quest

Todd Wood

PRJ Books, Dayton, TN, 2018

John Woodmorappe

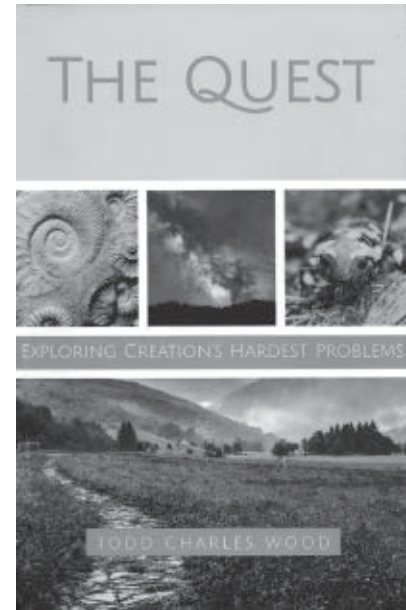
This book advertizes itself as a search for understanding of mysteries facing creationists. However, insofar as this is true, it generally ignores the creationist research that has already been done to solve difficulties and mysteries. In some ways, it comes across as an advertisement for evolution. Let us begin with a positive feature of this book.

Theistic evolution, and not creationism, makes God out to be a deceiver

Evolutionists commonly accuse the creationist position of being one that makes God out to be a Creator that plays mean tricks on us. According to this narrative, God created the universe by fiat in six days, and several thousand years ago, while leaving behind 'so much evidence' for organic evolution and for an old Earth.

Actually, the 'God made into a deceiver' accusation can be turned around, as Wood makes clear. He comments:

"But does that mean God accommodates error? ... Because if evolution is true and Genesis is accommodated, that is exactly what God did. He took erroneous ideas about



the origin of the universe and wrote them right into the text of the Bible. He could have revealed this theology in another way. Several creation psalms and even the end of Job present God as the absolute, unrivaled creator and sustainer of the universe without telling any detailed story about creation. He didn't have to tell a series of creation fables, but he did. He preserved them for thousands of years, and all the while, his followers assumed that they were historical and not fables at all. He knew that one day we would discover the 'truth' about evolution, and he knew that that discovery would cause a great crisis of faith that continues to this day. And he knew that the discovery would come at a time when the population of the world

was the greatest and communication was most sophisticated so that the greatest number of people would be offended and fall away because of evolutionary science. With that knowledge, he did it anyway. He included a myth at the beginning of the Bible knowing that Christians would interpret it as a historical account of the origin of the world and knowing the havoc that would ensue when the truth was discovered. Does that sound like a God who loves truth?" (p. 51).

The question of fideism

The author rejects the label of fideism (p. 41). However, it all depends on how the term is defined, and what it means in practice. Fideism, in the context of competing theories of origins, refers to a professing creationist who contends that the evidence supports evolution, but the 'higher authority' of the Bible is what compels him to accept special creation regardless of the scientific evidence. (I once personally heard Kurt Wise utter such a formulation.)

'Is so-and-so a fideist?' is a rather personal question, and is the wrong one to ask. 'Is so-and-so excessively conciliatory to evolutionistic thinking?' is a much more perceptive question to ask. In the case of author Wood, the answer is largely in the affirmative, as elaborated below.

Confusing mosaic creatures with valid evolutionary transitional forms

Todd Wood gives away the store as he writes: "I'm basically conceding that evolutionary theory successfully predicted the existence of intermediate forms. There really are things that look sort of like 'missing links'" (p. 26). Wood then brings up the australopithecine Lucy, *Australopithecus sediba*, the feathered dinosaurs, the mammal-like reptiles, and the 'walking' whales. Wood adds

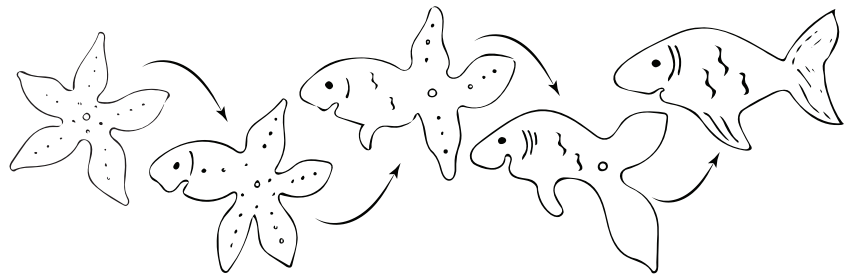


Figure 1. A series of supposed evolutionary transitions illustrating the hypothetical evolution of a fish from a starfish

that: "on the whole, the existence of these intermediate forms sure does look like a kind of evolution" (p. 29).

As if trying to sound even more pro-evolutionary, Wood quips: "That strange mix of ape and human characteristics was something that modern creationists had never anticipated" (p. 23).

Let us examine some basics. Wood's assertion is incorrect. Creationists, far from being taken by surprise, had long been aware of, and had accounted for, mosaic creatures. Think of the century-known *Archaeopteryx* and the mammal-like reptiles. Nor do mosaic creatures require, or even favour, an evolutionary explanation. They can be found among machines, which, of course, are the products of special creation, not evolution. I elaborate on this below.

Back to basics: what exactly is an evolutionary transitional form?

The central problem with Wood's thinking, and that of too many other creationists, is not only a confusion of mosaics with transitional forms. It is more fundamental: a forgetting of what is a transitional form.

Nearly 50 years ago, the immortal Duane T. Gish unambiguously specified the nature of evolutionary transitional forms. Dr Gish was in debates with evolutionists, and he was wise to the fact that evolutionists would try to pass off various mosaic creatures as evolutionary transitional forms, just as Todd Wood does today.

Let us focus on the tetrapod limb. Consider a putative dinosaur evolving into a bird. One should see, in the fossil record, this series of genuine evolutionary transitions: a 'dinobird' having 90% legs/10% wings, succeeded by a 'dinobird' having 80% legs/20% wings, one with 70% legs/30% wings ... 10% legs/90% wings, and then finally a fully-fledged bird (pardon the pun).

Similar sets of genuine evolutionary transitions should be found in all the other instances of the appearance of volant creatures—insects, pterodactyls, and bats. A comparable set of genuine transitions, albeit between the fin and the leg (90%/10%, 80%/20%, etc.), should span all the evolutionary instances of aquatic vertebrates giving rise to land vertebrates, and vice versa (leg to fin, as in the evolutionary appearance of whales, 10%/90%, 20%/80%, etc.).

The lesson to be learned from all this is clear: do not confuse mosaic creatures with genuine evolutionary transitional forms! The foregoing definition of a genuine transitional form is not limited to 'Protestant fundamentalists'. It has also been recognized by Islamic creationists. In this case, it is the hypothetical evolution of a fish from a starfish (figure 1).

Those feathered dinosaurs again—what's the hype?

Let us return our attention to mosaic creatures—on their own terms.

Feathers used to be associated exclusively with birds, but now are believed also to be found in some dinosaurs. Wood mentions this in a ‘gee whiz’ fashion without a semblance of critical analysis.

What if no feathered dinosaurs had ever been discovered? Would evolutionists have concluded that evolutionary theory had been falsified? Certainly not. They would have changed their story: they would just have said that the evolutionary origin of feathers evidently had postdated the evolutionary divergence of birds from dinosaurs.

Feathers have multiple functions besides flight. So why is it supposed to be remarkable that some non-birds have them also?

Mosaic creatures and morphospace: an analogy from machines

The finding of more and more mosaic creatures in the fossil record is hardly surprising, because there is an almost-inevitable filling of morphospace as more and more fossils are discovered. Far from being some kind of stumbling block to creationists, it can just as easily be explained by special creation as by evolution. Living things are essentially living machines, and, just like their man-made inanimate counterparts, they unsurprisingly show gradations in structure. As an example, one could easily assemble a series consisting of a conventional leg-driven bicycle, a two-wheeled motorcycle, a three-wheeled motorcycle, and a four-wheeled automobile. There is a clear gradation of structures, and numbers of wheels, but it is not the outcome of evolutionary processes. It is a product of special creation.

Let us take this further. Up to now, there has been an unambiguous boundary between motor vehicles and man-powered vehicles. Enter the ‘discovery’ of an ordinary leg-driven bike that has a working gas-motor attached.¹ This

means that man-powered propulsion can work in tandem with motorized propulsion in the very same vehicle. Does this ‘discovery’ now mean that the previously believed dichotomy between motor vehicles and man-powered vehicles is an illusion? Not quite. Does it mean that the two-wheeled motorcycle evolved from a leg-driven bicycle, moreover with the leg-driven motorized bicycle a perfect evolutionary transition? Still less likely.

***Australopithecus sediba*: baraminology vs functional essence**

The problem with conventional baraminology is that it effectively counts nuts and bolts instead of looking at the overall functional essence of the organism. To illustrate: suppose we did a baraminological analysis of the five vehicles described above, and found that, owing to the proliferation of moving parts inside the motor, the leg-driven motorized bicycle groups with the motorcycle instead of with the purely leg-driven bicycle. Contrariwise, the functional essence of the leg-driven motorized bicycle is much closer to that of the simple leg-driven bicycle than it is to the motorcycle. After all, there is a world of difference between the speed and power of the motorcycle and that of the motor-added leg-driven bicycle! Is the lack of agreement between the groupings some kind of profound conundrum, much less evidence for evolution? Hardly.

The resolution to the conflict is obvious: functional essence outweighs any grouping based on nuts and bolts. Let us apply this to *Australopithecus sediba*. What is relevant is not whether the osteological features (nuts and bolts) of *A. sediba* group it with the human (or, for that matter, the chimp), but whether, in life, *A. sediba* functioned like a human or whether it functioned like a chimp.

Is evolutionary theory consilient?

Todd Wood appears to be impressed by the overall claims of evolutionary theory. He refers to what he believes is its consilience (pp. 70–71), which means that different lines of evidence presumably all converge on the same evolutionistic explanation. He then spanks creationists a bit, saying that they need to “pony up” and show how the creation model works better than evolution, or else there never will be an effective challenge to the dominance of evolutionary theory.

To begin with, there is no way that special creation could ever displace evolution in the educated Western mind. Academia has been ruled by rationalism for at least the last two centuries, and there is no chance that any theory that relies on supernaturalism could ever be entertained as a scientific one, regardless of the strength of the evidence supporting it.

Wood contends that the presumed consilience of evolutionary theory is not affected by what he calls “a little problem here or there”. This smacks of an evolutionary self-congratulatory mindset.

Let us examine, once again, some basic facts. There have been many *ad hoc* modifications throughout the history of evolutionary theory. For instance, at one time vestigial organs were considered a powerful prediction of evolutionary theory. After all, so the argument went, no Intelligent Designer would make organisms with non-functional components. That was then and this is now. With the discovery of function for most if not all so-called vestigial organs, all of a sudden we do not hear about this powerful prediction any more. Instead, we now hear of “reduced function”. Evolutionists have moved the goalposts.

Evolutionary predictions as to what new fossils will be like are, at best, equivocally successful. For instance, ruling evolutionary orthodoxy had us believe that, so long as dinosaurs were

around, mammals were constrained to remain rat-sized or smaller, because all the medium- and large-body niches were preoccupied by dinosaurs. It made sense. And then came the discovery of mammals, of significant body size, well before the conventionally dated extinction of the dinosaurs.

Much is said about the nested hierarchies of living things. But then there is all that homoplasy, which, by definition, violates evolutionary nested hierarchies. Homoplasy systematically occurs at every level of anatomy and even molecular biology. And yet Wood is impressed by what he calls the pattern of similarities and differences and the presumed explanatory power of evolution in this regard.

Then there are those transitional forms again. Phyletic gradualism predicted their importance, while the newer punctuated equilibrium concept did not. So, no matter what turns up in the fossil record, it will be 'consilient' with evolutionary theory! Molecular 'clocks' often conflict with evolutionary origins as deduced from paleontological evidence. This is the exact opposite of consilience.

Consider human evolution as a whole. Compare the scenarios taught in textbooks, as fact, 50 years ago with those taught, as fact, today. Quite a difference. Here we are, 150 years after Darwin, and evolutionists still have no idea how life supposedly arose from lifeless chemicals. There are scores of conflicting theories about the cause of the Cambrian explosion, the relatively tiny forearms of tyrannosaurid dinosaurs, the emergence of human bipedalism, and much more. So much for the wondrously consilient, explanatory power of evolutionary theory.

Todd Wood moves on to geology, and claims (p. 96) that different evolutionary dating methods usually agree with each other for the same rock. This is certainly untrue.²

Pat answers and the pat dismissals of answers

Todd Wood states that many things are mysteries that require considerable research, and repeatedly warns creationists of relying on pat answers. However, pat answers are only one side of the coin. Pat dismissals of answers (including naïve falsification, elaborated below) can be just as objectionable as pat answers.

Let us consider an example. Wood states that he finds the long-proffered 'Cain's sister' explanation for Cain's wife unconvincing (pp. 136–137), but does not tell the reader why. At other times, Wood mentions that creationists have proposed answers to certain riddles, but does so with a rather superficial and dismissive tone. I also speak from personal experience. In evaluating a paper I had written, Wood once arbitrarily asked me not to use a certain commonly used term—without explaining the reasoning behind his objection.

When it comes to pat dismissals of answers, I also speak from personal experience. A referee used by Wood strongly (not to mention emotionally) recommended rejection of my submitted paper without so much as the slightest hint of why it was supposed to be so abysmally incorrect or inadequate. For a time, Wood unilaterally accepted the referee's recommendation. Now, being shown to be wrong is one thing: it is part of the learning process, especially in science, and I accept it. Being summarily dismissed is quite another, and I do not.

In addition to all this, pat answers are probably not the greatest liability facing creationists: the 'bandwagon effect' of faddish theories is probably a greater liability. For quite a while, I have been a bit of a gadfly in challenging my fellow creationists for uncritically buying into uniformitarian ideas and 'importing' them into Flood geology, for failing to engage in divergent thinking, and for settling for single (as opposed to multiple) working hypotheses (e.g. catastrophic plate

tectonics instead of equal consideration of static continents; asteroid impacts instead of equal consideration of non-impact origins of such things as shock quartz; and accelerated radioactive decay instead of equal consideration of massive isotopic fractionation).

Biogeographic distributions and naïve falsification

Todd Wood brings up Acosta, who had visited South America in the 1500s, and who was amazed to find the South American animals so different from those of Eurasia and Africa. This was supposed to have profoundly upset (falsified) the idea that all land animals had originated from Noah's Ark at Ararat, prompting Acosta to wrestle with the unexpected evidence.

For someone in the 16th century to be stymied by biogeography is one thing; for someone in the 21st century—quite another. Thus, in making the unusual fauna of South America some kind of profound mystery to creationism, Wood is engaging in simplistic dismissal by completely disregarding what has been learned about biogeography since the 1500s! For instance, we know that sweepstakes routes are very important, and these must have been quite pronounced after the Flood, for reasons discussed elsewhere.³ Moreover, those animals located on land masses the furthest from Ararat (South America and especially Australia), having gone through the most sweepstakes, should in general be the most biogeographically differentiated. And that is exactly what we find.

Nearly 30 years have passed since I investigated this subject,² and, unfortunately, very little research has since been done in this area. One could start with computer simulations of various sweepstakes routes opening and closing as animals leave the Ark. In some of these runs, the faunas on different continents could end up quite the same, and in others even more differentiated than actually exists on

Earth today. In one of these runs, the kangaroo could be found in Europe, while the placental opossum and raccoon are found only in Australia.

As for human introductions of animals, considered by Acosta and further developed by me,² there is needed an in-depth anthropological study of the kinds and patterns of animals deliberately introduced by humans.

The research results could then be synthesized. Only then can we begin to answer if biogeography is some kind of profound mystery to the creationist position.

Conclusion

No one questions the fact that creationists have mysteries that they are in need of solving. However, mixing evolutionary ideas with creationist ones, having a high view of the claims of organic evolution, and largely ignoring the work that creationists have already done, is not the way to go about it.

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Matti Leisola— bioengineer dumps Darwin, declares design

Heretic: One scientist's journey from Darwin to design

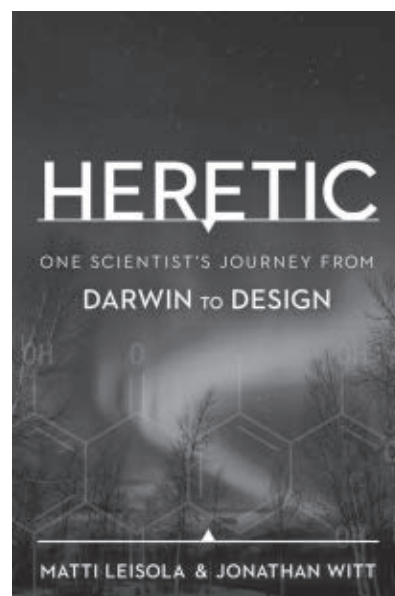
Matti Leisola and Jonathan Witt

Discovery Institute Press, Seattle, 2018

Gavin Cox

Matti Leisola and Jonathan Witt have written a very readable and engaging book in 11 layman-friendly (and one technical) chapters. Endnotes appear at the back, along with a helpful alphabetic index, all in 257 pages. *Heretic* outlines the experience and career of bioscientist Matti Leisola and his conversion from evolutionist to Intelligent Design advocate. This is not a science book; it is a personal account of a journey from Darwin believer to Darwin skeptic and a career spent in the practical pursuit of intelligent design in academia, industry, and public discourse.

Leisola is a high-flyer in both academia and industry. He was the Dean of Chemistry and Material Sciences at Helsinki University of Technology, with 140 published papers, and is expert in rare sugars and enzymes. He served as research director of an international biotech company (Cultor), co-founded the International Society of Rare Sugars and became founding editor of *BIO-Complexity*, an online journal which “aims to be the leading forum for testing the scientific merit of the claim that Intelligent Design (ID) is a credible explanation for life”.¹ Because of this, Leisola is well worth listening to.



Evolution and phlogiston: theories that explain everything explain nothing

This book is a fun read. I particularly enjoyed Leisola’s ability to poke fun at evolution. The following highly quotable-quote from Leisola, comparing the plasticity of evolution to the chemical paradigm of ‘phlogiston’, is gold. He explains:

“The story of phlogiston shows how an established paradigm may persist in the face of contrary evidence because its supporters patch it up *ad nauseum* instead of following the evidence. The Darwinian theory of evolution is the phlogiston of our day, festooned with a myriad and growing number of patches” (p. 198).

Leisola waxes eloquent, stating: “Evolution is slow and gradual except when it is fast. It is dynamic and creates huge changes over time,

except when it keeps everything the same for millions of years. It explains both extreme complexity and elegant simplicity. It tells us how birds learned to fly and yet also lost that ability. Evolution made cheetahs fast and turtles slow. Some creatures it made big and others small; some gloriously beautiful and others boringly grey. It forced fish to walk and walking animals to return to the sea. It diverges except when it converges; it produces exquisitely fine-tuned designs except when it produces junk. Evolution is random and without direction except when it moves toward a target. Life under evolution is a cruel battlefield except when it displays altruism. Evolution explains virtues and vice, love and hate, religion and atheism. And it does all this with a growing number of ancillary hypotheses. Modern evolutionary theory is the Rube Goldberg of theoretical constructs. And what is the result of all this speculative ingenuity? Like the defunct theory of phlogiston, it explains everything while explaining nothing well” (p. 199).

Intelligent Design proponent

Leisola’s book *Heretic* is in the ID camp, having been published by the Discovery Institute. However, several statements in his book lean towards a biblical understanding of history, including the Fall (p. 204). Unfortunately, there are no direct statements regarding the age of the earth, and in places Leisola seems to take the ‘Cambrian explosion’ at face value (pp. 48–51, 54–55, 101, 148, 234).

Also absent from Leisola’s book is any direct discussion of a ‘spiritual conversion experience’, but reading between the lines one can listen to a fellow believer of great maturity, integrity, and experience with desire to reach others with Gospel truth. This is

confirmed in an earlier interview with Jonathan Sarfati for CMI’s *Creation* magazine in 2010, where Leisola discusses his clear conversion from atheism to Christianity.² In *Heretic*, Leisola discusses theistic evolution (TE) and makes some refreshing and candid admissions. I found myself holding my breath while reading, because he states:

“Some theologians find themselves attracted to this hybrid approach [TE], and I understand how it might be a tempting option for those repeatedly told that evolution is a ‘fact’ supported by the ‘scientific consensus’. I understand because I myself was convinced of it in this way as a young scientist. But my journey from Darwin to design has convinced me that the great weight of scientific evidence is against theistic evolution because it is against blind evolution generally” (p. 213).

Leisola is really describing his journey from theistic evolutionist to biblical creationist. In *Heretic*, Leisola outlines his growing skepticism over evolution, after his own philosophical presuppositions were challenged by reading Francis Schaeffer, who talked of evolution producing a “line of despair” between faith and reason (pp. 17–18). Leisola recognized that methodological naturalism is the only guiding principle allowed by the scientific establishment, and origin-of-life stories have to be materialistic, otherwise they are censored. Leisola admits most scientists believe evolution because other scientists believe it, and when pressed, have very little evidence to back up their beliefs. He recalls how he began to see through the bluster and hand-waving and recognized the steps for life to arise by chance were impossible.

I was very impressed to read of how influential Leisola was with his students, who found his critique of evolution during his lectures very

stimulating, some even remembering 40 years later what they had heard in class (pp. 58–59). During his academic career (late ’70s to early ’80s), Leisola had significant public impact due to his skepticism of evolution, both in print and on radio. This included interactions with high-profile professors who defended Leisola’s position, knowing the evidence was lacking in the Darwinian account of origins. For instance, Professor Jouko Virkkunen, physicist at Helsinki University of Technology, publicly sided with Leisola, live on TV, doubting the Darwinian mechanism could ever produce new biological structures—such as a new hand—stating, “I do not understand how a random mechanism can produce fine mechanisms, a control system, and the computer program in the brain to move the hand. Evolution stands on clay feet” (p. 71).³

Design aired on national TV

Leisola recounts how he became involved in a Finnish TV production that was interested in his conversion from Darwinist to design advocate. The resulting film *The Deep Waters of Evolution* is available on YouTube,⁴

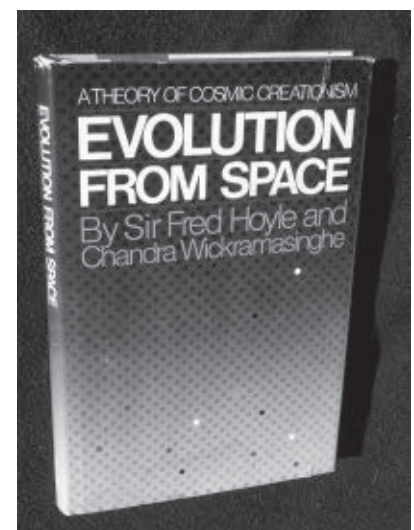


Figure 1. Chandra Wickramasinghe openly questioned Darwinian evolution in his book co-written with Fred Hoyle.

and is worth watching, as it sums up Leisola's career experiences well to that point. There are a number of significant interviews in the film including Dean Kenyon, who recalls how he recanted his own theory of chemical evolution after reading A.E. Wilder-Smith's criticism in his book *The Creation of Life* (figure 1). Here, Wilder-Smith concludes from Kenyon's work, quipping "Kenyon's theory would lead us to believe, in essence, that life is by no means an accident but that it is based on a secret hidden in non-living matter."⁵ Kenyon recounts how he later met Wilder-Smith and admitted he wasn't angry about the criticism of his theory because, in his words, it was correct! A number of others were approached for comment in the making of the film, including Chandra Wickramasinghe, who recounts how he had to flee Britain to his native Sri Lanka, after receiving death threats for his public questioning of evolution in the 1981 book titled *Evolution from Space*, co-written with Fred Hoyle (p. 110) (figure 2).

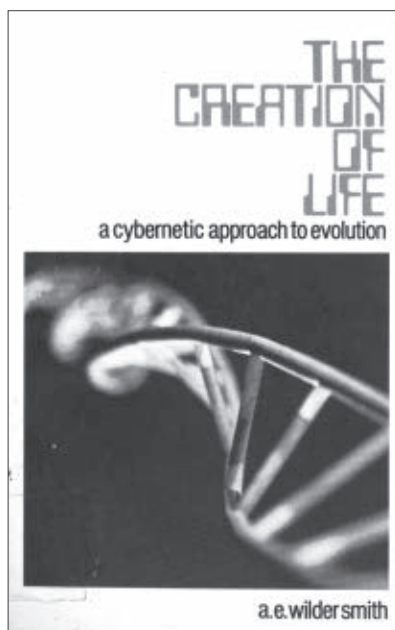


Figure 2. A.E. Wilder-Smith provided a thorough refutation of chemical evolution.

Leisola complains that even though *Deep Waters* was aired on Finnish TV it was shown on Good Friday, as though it were a piece of 'religious programming', and not purely a scientific critique of Darwinism. As he points out, all science documentaries and TV programming in Finland (and typically in the West), are pro-evolution and never show a balanced view—including creationist or ID ideas.

Leisola mentions his participation in CMI's 2009 award-winning documentary *Darwin: The Voyage that Shook the World*,⁶ which was even praised by evolutionists for its extremely high production values and balanced treatment of Darwin. But, as Leisola points out, despite having two Finnish professors interviewed, the documentary was censored from being aired on Finnish TV (p. 115). In this documentary, Leisola discusses the definition of evolution as "molecules to man", and recognizes the changes observed in nature, such as speciation, do not provide evidence of new structures and information required for evolution to be true. Leisola also points out that Darwin, along with the science of his time, had no idea of the complexity of the cell, and that cells can be likened to 'cities of complexity', full of information processing and molecular machinery. Leisola's contribution to CMI's documentary is therefore significant.

The Finnish church's Darwinian compromise

Leisola bemoans the compromise of the Finnish Lutheran church. "My own view of Christian faith is that one of its main purposes is to disturb established institutions with sharp questions and function as their conscience" (p. 127). The Lutheran church's woeful compromise has also been replicated in the Finnish school system, which is thoroughly naturalistic, and any

discussion of religion is only allowed by Darwinists. The takeover of naturalism in Finland was very sudden and can be pinpointed to between the years 1883–1885, during which time the established church, en masse, capitulated to Darwin, as it continues to do to the present day, the Finnish Bible Institute being a typical example of such public 'churchian' compromise (p. 133).

The inadequacies of peer review

Leisola recognizes the limitations of peer review, that it is deeply conservative and only operates within the naturalistic paradigm. Even when it comes to good operational science, peer review will often reject evidence it deems to be outside the accepted norm (p. 153). A prime example that impacts upon the age of the earth, which Leisola is well aware of, is Mary Schweitzer's work on dinosaur soft tissue and the problems she faced in the peer-review process. I found this encouraging to read in an ID book.

Warren Hamilton, who is a very famous conventional geologist, describes peer review as the "tyranny of the majority" (p. 136), as he has experienced papers being blocked because of the perceived challenge to "accepted concepts". Günther Blobel (Nobel prize in physiology and medicine), regarding the peer-review process, bluntly states, "grants and papers are rejected because some stupid reviewer rejected them for dogmatic adherence to old ideas" (p. 136).

The norm, therefore, is that any paper that is critical of Darwin, and supportive of design, simply won't get through the peer-review process when submitted to a journal. An infamous case involved a Chinese publication on the architecture of the hand, where the paper made a sole reference to a 'creator' (which, in context, referred to impersonal nature, rather than God),

but which was subsequently withdrawn from publication (p. 137) in a fit of academic paranoia.⁷

An astonishing example of academic persecution is the case of Stephen Meyer's paper considering ID as a possible explanation for the Cambrian explosion. Three reviewers unanimously favoured its publication and Richard von Sternberg, editor of the *Smithsonian Institute Journal*, accepted the paper, which was subsequently published. The resulting outcry from committed evolutionists forced Sternberg to resign from his position, amid swirling accusations. As Leisola points out, the Darwinists wanted to make Sternberg an example, so that other journal editors didn't make the same 'mistake' of publishing anything even remotely embarrassing to the Darwinist cause. These reasons and more prompted Leisola to start a new open journal based at BIO-Complexity.org, with papers offering challenges to the neo-Darwinian worldview, which, as he recalls, has been greeted by many with great hostility (pp. 179–181).

Academic censorship

After the 1980s, Leisola experienced the complete clampdown on freedom of thought in academia, where public questioning of Darwin was not tolerated. This was manifested both in the passive non-engagement, and complete ignoring of Leisola as an academic (along with his like-minded colleagues)—to the public denouncement of Leisola's pro-design views in the journals. Leisola's association with the triple Ph.D., English, creationist A.E. Wilder-Smith (1915–1995) also brought much publicity, both positive and negative (pp. 74–75).

From the perspective of reading about the history of the creation movement in Europe, Leisola's book makes for some very engaging reading. For instance, he organized high-profile

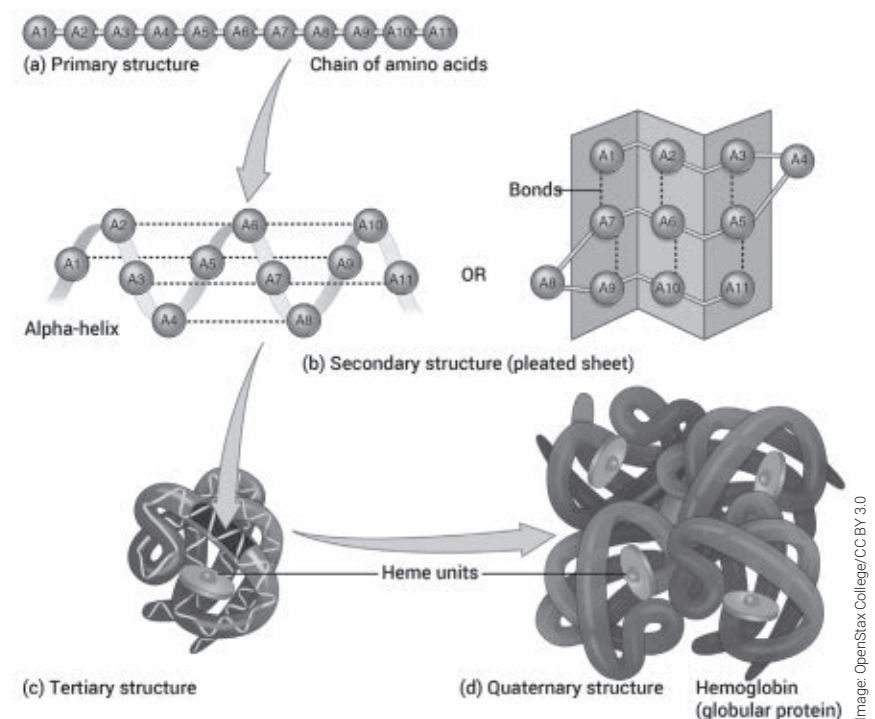


Figure 3. Protein chains on average are 300 amino acids long, and require folding to highly specified shapes in order to function correctly. Such highly ordered and specified complexity could not arise by chance in the supposed universe's supposed secular time-frame.

seminars to discuss the weakness of Darwinism, including with Lennart Saari, a noted ornithologist, along with creationist Siegfried Scherer (professor of microbial ecology). In 2003 Leisola organised a seminar with ID proponents Paul Nelson, and Richard Sternberg, vs Antto Leikola and Petter Portin, both well-known evolution-promoting university professors (p. 78). Unfortunately, due to pressure from Leisola's university, the event was cancelled, with an explanation given that this was better served as a 'philosophy event' (i.e. not science). A rescheduled, retitled event took place, which again was opposed, but nevertheless went ahead, and was received extremely positively (p. 79). However, press and academics alike vilified the event (despite not attending), and the university demanded the removal of the lecture notes from Leisola's lab web page.

Bacteria evolving into—bacteria?

Leisola cites the work of Robert Lenski, who bred thousands of generations of bacteria, in lab conditions, to investigate evolution. A *New Scientist* report stated in 2008, "It's the first time evolution has been caught in the act of making such a rare and complex new trait." Leisola dryly comments:

"... notice that for 150 years we have repeatedly been told that the grand powers of the mutation/selection mechanism have been proven beyond a shadow of a doubt. And yet here, in 2008, a prominent science journal reports that a lab has uncovered the *first evidence* of evolution's ability to innovate in an impressive way. The implication shouldn't be missed: All the grand claims for evolution that came before this lacked empirical support" (p. 164).

Leisola cites Michael Behe, who has commented on this experimental result, reasoning no new information

was added; rather, existing genes were mutated, or turned off, resulting in a net saving of energy for the organism—but that’s it, nothing new was created, despite the *New Scientist* hype (p. 164). To drive the point home, Leisola quotes Alan Linton, a professor of bacteriology from Bristol University, who says, “Throughout 150 years of the science of bacteriology, there is no evidence that one species of bacteria has changed into another” (p. 167). Leisola can speak authoritatively from his years of experience in the bioengineering industry, producing complex sugars using yeasts. His experiences of the limited range of mutation has convinced him of the extreme limitations of the evolutionary process. All of the desired results were gained not through random mutations, but “fore-sight, planning and design”, which as he points out, are all things lacking in the neo-Darwinian process (pp. 172–173).

Evolution impossible

When it comes to functionality at the molecular level, specific proteins are required. To select a functionally correct protein randomly from all the possible protein shapes that are theoretically available, Leisola explains, is a huge task. If left to natural selection, there would be a staggering 1 in 10^{100} possibilities of selecting a correctly functioning protein (based on an average length of 300 amino acids) (pp. 182–184). When we consider there are ‘only’ 10^{82} atoms in the visible universe, selecting the right atom at random is far easier than selecting the right protein by chance (p. 184) (figure 3).

Despite this, genetic engineers use a process they term ‘guided evolution’ to produce ‘amazing results’ in terms of arriving at functional enzymes. However, Leisola points out, these lab processes are nothing like what happens in nature, but are intelligently designed, complex scientific

procedures. To further quantify this picture, Michael Behe, in his book *The Edge of Evolution*, discusses the very limited nature of what mutations can achieve—specifically seen in the malarial parasite, which is the parade example in Behe’s book. Put simply, evolution has failed to evolve a solution to malaria’s inability to bypass the sickle cell in humans, and has failed to solve its inability to function in colder climates.

Leisola recognizes that to get two or more correct proteins to function together by chance is more than can be expected in the evolutionary timeframe (p. 190). He states, “Mutation and selection can improve good designs but never invent a design” (p. 191). Dan Tawfik (of the Weizmann Institute, Israel), who studied how proteins *may have* evolved, is candid about origin-of-life problems, saying, “Evolution has this catch-22: Nothing evolves unless it already exists”, but of the first enzymes and other proteins, he describes their origin as: “something like close to miracle” (p. 195). Leading synthetic chemist James Tour says of the origin-of-life question:

“I have asked all my colleagues—National Academy members, Nobel Prize winners—I sit with them in offices. Nobody understands this. So if your professors say it’s all worked out, if your teachers say it’s all worked out, they don’t know what they’re talking about” (p. 221).

Conclusion

Heretic ends with a challenge for scientists to go where the evidence leads them, and to be open to honest interpretation of that evidence. Reading Leisola’s book, full of quotable quotes, one quickly comes to the conclusion that he is a brave warrior for Gospel truth, for academic freedom of speech and for open discussion between scientists, regarding Darwin’s theory of evolution and its inability to describe

the complex world of nature. Would that there were more like Leisola in secular academia today, willing to put their heads above the parapet of the ruling materialist paradigm. His book *Heretic* is an excellent read; though technical in places, I can thoroughly recommend it for the creation/ID section of your book shelf.

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A successful decade for 'Mendel's Accountant'

Robert W. Carter

A powerful computer program with far-reaching consequences has been developed by a group of biologists and computer scientists. Striking at the heart of neo-Darwinian theory, it tackles the subject of mutation/selection using a straightforward method called genetic accounting. Named 'Mendel's Accountant', this software platform provides a comprehensive refutation of multiple aspects of evolutionary theory using nothing but standard evolutionary population genetics. The developers have used it to quantify the actual selection threshold for new mutations, to test alternate evolutionary ideas (e.g. unusual selection models, such as 'synergistic epistasis'), to quantify the long-standing 'waiting time problem' for new beneficial mutations, to make predictions about the long-term effects of mutation accumulation in viruses (which were later confirmed), and to compare different historical population models to the modern human mutation frequency spectrum seen in the 1000 Genomes Project data. Their results represent a complete refutation of the 'primary axiom' of neo-Darwinian theory. Computationally, the mutation/selection model fails in multiple ways.

After the success of *Radioisotopes and the Age of the Earth (RATE)*,¹ the Institute for Creation Research began another major endeavour they called the GENE project. Even though this second project received much less fanfare, it achieved significant results and documented these in multiple publications. Essentially, every major goal they began with has been achieved. My involvement in the GENE project led to the publication of the 'mitochondrial Eve' consensus sequence in *Nucleic Acids Research* and a follow-up paper at the 2008 International Conference on Creationism.^{2,3} But one aspect of the GENE project deserves special attention: the population-modelling program 'Mendel's Accountant'. This is a computer platform that enables users to test fundamental aspects of neo-Darwinian theory, using nothing but the tools of standard evolutionary population genetics. Major discoveries and advances were made possible thanks to the development of this powerful research tool.

Setting up the problem

For many years, neo-Darwinian population geneticists have been boasting about how successful their ideas were in making predictions, but they were obscuring significant problems. Specifically, they had grave mathematical difficulties when trying to explain how mutation and natural selection could produce the observed complexity of life. John Sanford calls mutation/selection the 'primary axiom' of neo-Darwinism in his groundbreaking book *Genetic Entropy and the Mystery of the Genome*.⁴ In it, he says that population geneticists know that most mutations are deleterious. Also, it is widely known that natural selection and the occasional beneficial mutation cannot stop the gradual decline caused

by the accumulation of these slightly deleterious mutations. Individually, most mutations do no harm to the organism. But collectively, they can be catastrophic. They relentlessly accumulate in the genome over time because they are too weak to affect reproductive success. Since these deleterious mutations accumulate faster than they can be eliminated, the net result is genetic deterioration. When too many errors occur in a population, it enters a phase called 'mutational meltdown', which rapidly leads to extinction.

That is not merely a theoretical possibility. Given the measured rates of mutation and reproduction, Mendel's Accountant (the focus of this paper) shows that current evolutionary models result in genetic deterioration, suggesting that all complex life⁵ is degenerating. This fundamental problem exposes the unreality of Richard Dawkins' popular (but misleading) computer program that generated the phrase 'Methinks it is like a weasel'.⁶ Dawkins' simulation used an unrealistically low rate of mutation (merely one per progeny), plus an unrealistically high rate of reproduction (approximately 200 progeny per female), plus an unrealistically high rate of beneficial mutation (one in 27), and it locked any 'correct' mutation in a step-wise fashion, as if each step in the right direction was more grammatically correct than the nonsense phrase that preceded it. In these ways, and more, Dawkins' simulation was exceedingly unrealistic in favour of evolution.

The logic behind the genetic entropy problem was compelling, and was consistent with earlier mathematical analyses,⁷ but it was largely theoretical in nature when Sanford first wrote *Genetic Entropy*. Empirical testing of genetic entropy theory only became possible when a team of computer scientists and geneticists developed a computer

simulation that could realistically and comprehensively model the mutation/selection process. The result was Mendel's Accountant. This program models the mutation/selection process based upon the conventional, textbook understanding of evolutionary genetics. Unlike other modelling programs of this type, the key parameters are adjustable—allowing the simulation and testing of nearly any scenario of interest.

The program has undergone multiple updates and improvements, and significant new features have been added over the years (such as dynamic population size modelling). Since population modelling uses tremendous amounts of computer memory, the latest version is designed to run on large servers.

How does Mendel's Accountant work?

Programs of this type need to be documented and validated in the professional literature. This happened in 2007 and 2008.^{8–10} The program tracks all the mutations that occur among the individuals in a modelled population using a process the authors call 'genetic accounting'. When a simulated mutation occurs, it is assigned an identifier, a location on a chromosome, and a 'fitness' score using values that come from standard evolutionary genetics theory (i.e. although rare beneficial mutations do occur, almost all mutations are 'slightly deleterious'). By allowing for chromosomal recombination, the accumulating mutations get mixed into various combinations along each chromosome. Since children randomly inherit half of their father's and half of their mother's genome, some mutations are immediately lost. When it comes time to reproduce, some individuals fail to reproduce because they carry a greater load of harmful mutations. These are the individuals that are selectively eliminated, similar to the way Charles Darwin imagined natural selection to work. The program is extremely flexible, by design. Various models of selection, fitness, mutation, mating, and population structure can be applied to a given simulation.

What have we learned from Mendel's Accountant?

Early publications on Mendel's Accountant showed that, under normal conditions, mutations accumulate in a highly linear manner. This results in a continuous increase in the number of mutations per progeny over time. This increase is inexorable and irreversible, even when selection pressure is strong. As a result of the ever-increasing mutational burden, the Mendel simulations revealed that 'fitness' (a measure of total functionality) declines continuously over time, even with strong selection (figures 1 and 2).¹¹ This is a central problem for evolutionary theory, because if deleterious mutations cannot be removed, a species will deteriorate,

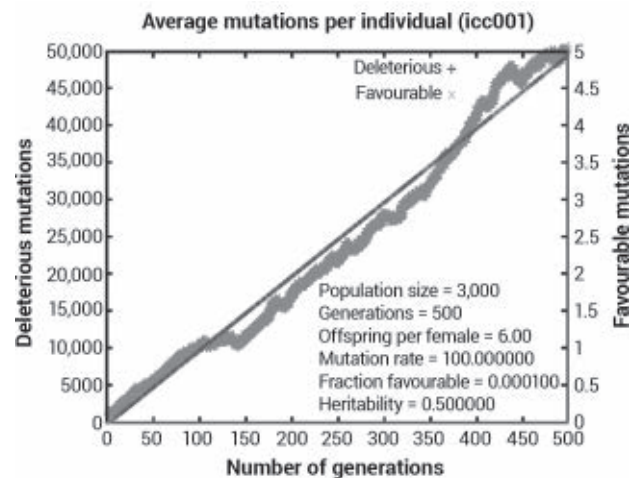


Figure 1. The number of deleterious and beneficial mutations accumulating in a model population over time, despite the winnowing effects of natural selection (after Baumgardner *et al.* 2008¹⁰). Straight line: deleterious mutations. Irregular line: favourable mutations. Since beneficial mutations are rare in standard mutation models (note the scale difference on the second y axis), random frequency fluctuations are more likely to affect the average. Thus, the favourable line has more 'wiggle'.

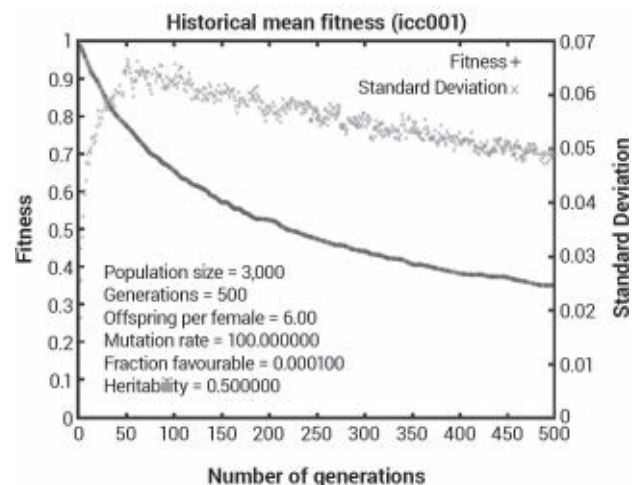


Figure 2. Inexorable decline in fitness (measured in terms of reproductive success) in the same model population as figure 1 (after Baumgardner *et al.* 2008¹⁰). Thick line: average fitness. Scattered points: standard deviation of fitness at each time step.

all the way to the point of extinction. This is the essence of 'genetic entropy', and thus Mendel validates genetic entropy theory.

For the first time ever, we can now model how quickly mutations accumulate in large populations, the effects of natural selection, the effects of population bottlenecks, and what happens when rare 'beneficial' mutations appear, all thanks to this evolutionary modelling program.

A Mendel review paper appeared in 2012 as a chapter in an academic compilation of papers relating to population

genetics.¹² This chapter not only described how Mendel worked, but it also described how Mendel compared to other significant evolutionary modelling programs. As of the time of writing, it was the only biologically realistic program of its kind. This is still true today.

Mendel's Accountant is the most accurate software available for realistically simulating evolutionary genetic models. That has been true since its beginnings a decade ago. Why weren't evolutionists the ones to produce it, or improve on it? Evolutionists had the know-how, plus access to super computers, and public funding. So why did a group of what they consider outsiders produce such a program and publicly promote it?

The answer is illuminating. There existed primitive forerunners of the Mendel's Accountant simulation. These forerunners, created by evolutionists, were simple by comparison, yet when realistic values for human reproduction rate and mutation rate were used they were already demonstrating genetic deterioration. In other words, the problem of genetic deterioration was known long ago, both in theory and in computer simulations, but they failed to pursue it further, as least not publicly.

Even today, anyone might attempt to refute the results of Mendel's Accountant by producing a more realistic simulation. But they have not done so, not even in 10 years. This lack of serious response further suggests that Mendel's Accountant is demonstrating real problems for evolutionary theory.

Biological Information—New Perspectives

In 2011, a conference was held at Cornell University entitled *Biological Information—New Perspectives* (BINP). Multiple speakers from a wide range of backgrounds presented papers at this conference, and Mendel's Accountant was featured heavily. Indeed, one of the goals of the conference was to highlight its power, and six papers based on Mendel were delivered. Each paper is readily accessible online (see references).

A paper by Gibson *et al.* addressed the question of whether or not purifying natural selection could preserve biological information.¹³ They concluded that selection was unable to preserve genetic information¹⁴ because it systematically degenerates. Therefore, all genomes decay over time. Intense selection easily removed the worst mutations, but the mutations that were slightly deleterious accumulated relentlessly and without limit.

Sanford *et al.* empirically measured the threshold where selection breaks down (called the 'selection threshold') and determined what factors affect it the most.¹⁵ In other words, they measured how impactful a mutation must be before natural selection can 'see' it. They found that almost

all mutations (both beneficial and deleterious) sit below the selection threshold, and so most mutations accumulate as if no selection was happening at all. When a mutational effect is below the selection threshold, that mutation is 'effectively neutral'. It is unselectable. Its effect cannot rise above the genetic and environmental 'noise'. This is true regardless of whether it is beneficial or harmful to the organism. None of the realistic simulations resulted in fitness gain.

Nelson and Sanford addressed the question of whether or not selection could preserve biological information using an alternative simulation.¹⁶ To do so, they rigorously compared results from Mendel experiments with results using one of the most popular evolutionary modelling programs out there, *Avida*. Interestingly, they discovered that an *Avida*-like model could only lead to evolutionary advance when extremely unrealistic parameter settings were employed in Mendel. *Avida* is highly unrealistic biologically. For example, *Avida* normally employs mutational effects that are grossly unrealistic (e.g. every step forward doubles total functionality/fitness). However, when realistic mutational effects were employed, there was no increase in fitness. Selection fails to create any new information, and any information already present degenerates toward 'zero', as shown by their detailed analysis of the inner workings of *Avida*.

Since the pioneering work of Kimura¹⁷ and Ohno¹⁸ in the late 1960s and early 1970s, evolutionary theory has recognized that, while most mutations are deleterious, individually their harmful effects are too subtle to be influenced by natural selection, and so cannot be effectively eliminated. Thus, a huge number of these 'nearly neutral' deleterious mutations accumulate continuously—like rust on a car. Even though an individual speck of rust is inconsequential to the function of an automobile, accumulating rust specks will eventually destroy it. Thus, mutations must be removed or the species will go extinct, and yet there does not appear to be any effective mechanism that can do this.

Two escape mechanisms have been proposed that, some have argued, might solve this problem. They are the 'mutation count' mechanism and 'synergistic epistasis'. These two mechanisms are similar. They aim to make the selection process more efficient, but in unrealistic ways. The mutation count mechanism works by (unrealistically) counting mutations in each individual, ranking the individuals by that count, then eliminating only those individuals above a certain count threshold. Nature does not operate that way.

Brewer *et al.* analyzed the mutation count mechanism.¹⁹ They showed that it does not work, except when using extremely unrealistic parameter settings (such as forcing all mutations to have the same fitness effect). Whenever parameter settings were used that were even remotely

realistic, the mechanism failed completely.

Synergistic epistasis assumes an (unrealistic) fitness model for describing how multiple mutations *combine together* in their effect on fitness. The idea is that when mutations interact with one another, they might sometimes amplify each other's deleterious effects. Selection might then become more effective and the mutations could be removed simultaneously (essentially killing two or more birds with the same stone). This is different from the traditional view of epistasis. For example, when *many* genes work together to create a light-sensing cell in the retina, these genes have an effect greater than the sum of their individual effect. In other words, the whole eye is greater than the sum of its parts. Likewise, harmful mutations in these genes, *in combination*, have a greater harmful effect than the mere sum of their harmful effects (a few little changes can have catastrophic downstream effects). That idea is well-established and is traditionally known as 'epistasis'. But 'synergistic epistasis' is quite different. It assumes it makes *no difference* whether the mutations are combined toward some useful combined function, such as sensing light. Instead it assumes any mutations, no matter what they affect, will have a magnified effect *in any arbitrary combination*. For example, it assumes harmful mutations to a toenail, the retina, and a tendon in the shoulder will have a magnified effect *in combination*, just as though they were doing something important together. This assumption is unrealistic. So unrealistic that evolutionary geneticists generally avoid it altogether (except when trying to solve such problems as genetic deterioration).

Baumgardner *et al.* examined synergistic epistasis.²⁰ They conclusively showed that synergistic epistasis does not help stop deleterious mutation accumulation. In fact, it greatly accelerates genetic degeneration and leads to rapid extinction.

Bringing it full circle

There was one other paper presented at the BINP meeting that is important for this discussion. Brewer *et al.* raised an interesting question in their paper on mutation accumulation in RNA viruses, which they modelled using Mendel.²¹ Given the error rate inherent in RNA viral replication and the size

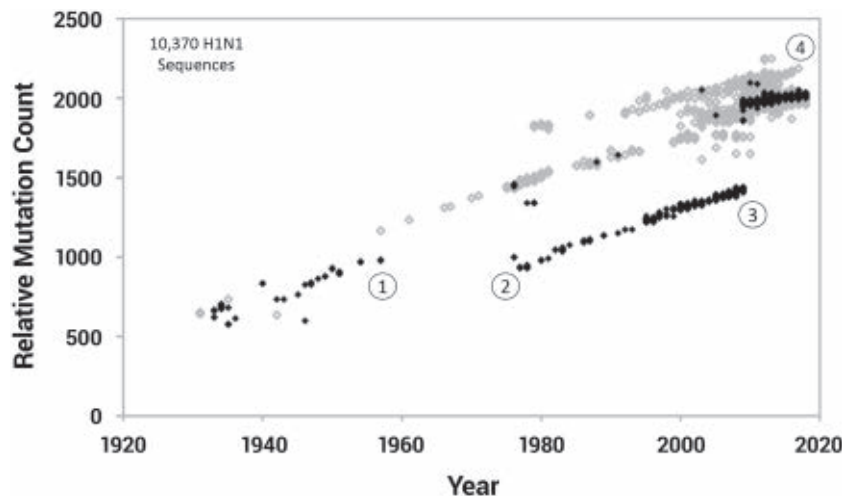


Figure 3. Mutation accumulation in the H1N1 influenza virus since 1918, from Carter 2019.²⁴ The published Brevig Mission strain from 1918 was used as the baseline for comparison with all available H1N1 genomes that had infected humans (dark diamonds) and swine (light diamonds) that were reported in the Influenza Research Database through late 2018. (1) The human H1N1 lineage goes extinct for the first time in 1957. (2) The human H1N1 reappears in 1976 after an accidental re-release in Moscow. This creates a disjunction in the trendline and allows for easy visual separation of the swine and human versions. Sporadic swine H1N1 infections occur in humans between 1976 and 2009. (3) The human H1N1 virus disappears from reporting in March 2009, the same year the swine H1N1 goes pandemic in humans. We first reported this in 2012. (4) Six years later, all currently circulating H1N1 viruses infecting humans derive from the swine virus. The second disappearance of the human version in 2009 occurred after 13% of the H1N1 genome had mutated due to the relentless effects of genetic entropy.

of the viral genome, RNA viruses are prime candidates for genetic entropy.

Carter and Sanford followed this up in 2012 with a study on the human H1N1 influenza virus, one of the most infamous RNA viruses in history, and the cause of the 1917/18 influenza pandemic that killed more people than died in WW1. We showed that mutation accumulation (despite lots of natural selection) led to the decline and eventual extinction of the virus (figure 3).^{22–24}

This was the first time that genetic entropy theory was experimentally demonstrated in a biological system, completing the cycle from theory, to simulation, to application in the real world.

Ratcheting up the pressure

This flurry of papers from the Cornell symposium on biological information was not the end of the discoveries being made by Mendel. Rupe and Sanford wrote a fascinating paper that described a new principle they called 'Haldane's Ratchet'.²⁵ They set out to demonstrate that the famous theoretical problem known as 'Haldane's Dilemma' was indeed a serious challenge to evolutionary theory.²⁶ Haldane's Dilemma derives from theoretical work performed in the 1950s, where Haldane showed that, even when there are a sufficient number of beneficial mutations in a population,

it takes too much time for selection to amplify them to the point where all individuals carry the ‘good’ mutations. The amount of time involved is simply unrealistic.

Haldane estimated that it would take 300 generations for a beneficial substitution to become ‘fixed’ (as in ‘stuck’, the point where all individuals carried a given mutation) in most populations. Thus, in three million years (the then-assumed time required for ape-to-man evolution), a pre-human population could only ‘fix’ about 500 beneficial mutations. This is a trivial amount of genetic information, which means Haldane’s Dilemma makes human evolution impossible. Rupe and Sanford used Mendel to simulate and experimentally validate that Haldane’s Dilemma is very real. In addition, they showed that *net* fitness declined due to the accumulation of deleterious mutations while the beneficial mutations were going toward fixation. In other words, for every beneficial mutation that was selectively fixed, a large number of nearly neutral deleterious mutations simultaneously drifted to fixation. The result is that, even in the most generous scenarios, net fitness only went down—it never went up. This one-way process acts like a *ratchet*, hence the title Haldane’s Ratchet, which is a hat-tip to another evolutionary paradox, Mueller’s Ratchet,²⁷ that deals specifically with mutation accumulation in asexual species.

In 2015, Sanford and colleagues published on the ‘waiting time problem’.²⁸ Evolutionists already knew that in all modest-sized populations there is a long waiting time before any specific point mutation will arise. This greatly amplifies the problem of Haldane’s Dilemma, which assumes that all required beneficial mutations are already in the population.²⁹ But single point mutations do not generally create new functions. For decades it has been argued how many beneficial mutations are needed, and how much time is needed, to typically evolve a new function. In this paper, they used Mendel to model strings of mutations in a human-like population. They showed that even a string of just two mutations required roughly 84 million years to arise and become fixed in the population. Of course, the string will *appear* more often than that, but since most mutations are lost to drift,²⁵ even when beneficial, the real waiting time is much longer than the ‘first appearance’ time. A string of five point mutations would take approximately two billion years to arise, catch hold, and go to fixation! This problem is similar to Haldane’s Ratchet—but more than a million-fold worse. The authors modelled different mutation rates, fitness benefits, and population sizes, but even when using extremely generous settings, the waiting time problem is devastating for neo-Darwinian theory, especially for species with long generation times (like humans).

Finally, Mendel was used to show that simulations that employed alternative population models created allele distributions that better matched the actual allele frequency distribution (as seen in the modern human population) than did simulations that employed evolutionary parameters

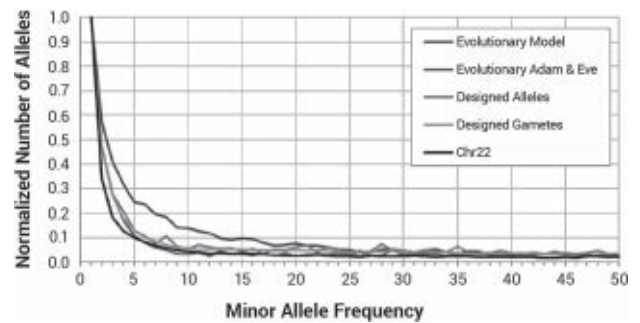


Figure 4. The allele frequency spectrum from several model runs compared to the real distribution, after Sanford *et al.* 2018.³⁰ This shows the allele frequency spectrum of all mutations found along chromosome 22 in the 1000 Genomes Project data (black line, to the left and bottom). Parallel to that are the results from several Mendel population models. Clustered near the 1000 Genomes data are an ‘evolutionary Adam and Eve’ model, in which a population of 10,000 individuals is allowed to mutate for tens of thousands of years before being reduced to a single pair, a ‘designed alleles’ model, in which the genomes of the biblical Adam and Eve are frontloaded with many neutral genetic variants, and a ‘designed gametes’ model, in which Adam and Eve’s reproductive cells are frontloaded with a different genome in each cell. Standing off from the others is an evolutionary model that has no bottleneck and in which a population of 10,000 individuals is allowed to exist for many thousands of years. Clearly, the standard evolutionary model is the worst fit to the real-world data. (See original paper for a colour version of this figure.)

(figure 4).³⁰ These results are intriguing. Since Mendel has already been demonstrated to be behaving according to standard evolutionary theory, the fact that alternatives to standard evolutionary theory better fit the real-world data should make us question some of the assumptions behind the ‘Out of Africa’ theory, for example.

Success has brought criticism

A Google search for Mendel’s Accountant will bring up multiple hits that criticize the program and the conclusions being drawn from its discoveries. Essentially none of these attacks are substantive, and many are highly misleading. It is clear that most people commenting on Mendel have not read either the documentation or the background papers. Thus, many evolutionists arguing against it don’t seem to understand their own theory. This is probably due to the anonymous nature of the internet, and the level of expertise required to make comments online (i.e. no understanding required). However, one anti-creationist blogger (not trained in either biology or genetics, and it shows) tried to build a credible case against the genetic entropy thesis, and thus tangentially attacking Mendel’s Accountant. John Sanford has rebutted that review in an important article on creation.com.³¹ We are unaware of any peer-reviewed paper that attempts to refute the methods or conclusions of Mendel. After a decade of established work, there should be *something*. Their silence is telling.

Conclusion

Mendel's Accountant represents a milestone in our understanding of how the mutation/selection process operates. It shows what mutation/selection can and cannot do. For the first time, a robust computer program is able to successfully model realistic populations, track mutations through time, and rigorously test different evolutionary scenarios. No longer can evolutionists hide behind the mutation-count mechanism or the synergistic epistasis mechanism. No longer can they use selection as a 'magic wand' to wish away the theoretical, mathematical, or computational difficulties they face. Mendel is a powerful tool and should be used often. The collapse of the Darwinian mutation/selection mechanism is profound, and this news deserves more attention.

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Biblical Ice Age solves uniformitarian global end-Pleistocene mass extinction debate

Michael J. Oard

For about 200 years the cause for the global end-Pleistocene mass extinction has been debated. However, there is no solution in sight. Two main options have long been competing: (1) *overkill*, where man is responsible for the mass extinction or (2) *overchill*, in which climate change caused the mass extinctions. Recently, researchers have proposed a 'Controversy Space Model' to help solve the debate, first by finding common ground between opponents, then 'refocusing' and 'solving' small parts of the problem in a step-by-step manner. However, some of the past 'obstacles' to debate resolution include Genesis and strawmen of what Genesis teaches. By revisiting those debates and following a biblical framework, and specifically its Ice Age model, the end-Pleistocene mass extinction issue can find fresh and fruitful solutions.

The global end-Pleistocene mass extinction has been a subject of debate for about 200 years, and there is no resolution in sight:

"Resembling the fascination for crime stories, speculations about the causes of terrestrial mammal extinctions in the Quaternary have been at the center of one of the most exciting and unresolved debates in contemporary biology. For the last two centuries, hundreds of papers have been written on this topic, proposing a range of explanations. ... and to this day there is no agreement forthcoming."¹

A little less than 65% of the megafauna over 44 kg (100 lb) went extinct worldwide near the end of the 'last' uniformitarian ice age (table 1). Different figures have been used by researchers in the past for Eurasia and Africa. Eurasia is now split between north and south, with fewer extinctions in northern Eurasia than previous statistics indicated, admitting little is known about extinctions in southern Eurasia (it was probably a low percentage).² Africa is now known to have had a small percentage of extinctions.

Although there are many hypotheses, two main options have long been competing: (1) *overkill*, where man is responsible for the mass extinction or (2) *overchill*, in which climate change caused the mass extinctions.

Major strengths and problems for overkill

Both overkill and overchill have strengths and weaknesses, which is why this debate is unresolved. Overkill advocates emphasize the 'timing' of man entering a continent. They conclude that the extinction of the megafauna coinciding with man entering new continents is not just a coincidence. They also point out that most of the extinctions were after the 'last' of ~50 ice ages of various intensities, so climate change cannot be the cause.⁵ This means that there was

something 'special' about the end of the last ice age. Since the only difference between the 'last' ice age and other glacial and interglacial phases is the colonization by man, overkill advocates see this as an argument for their position.

However, it appears on some continents the timing of man's arrival does not coincide with the extinctions. Assuming the 'Out of Africa' hypothesis, Eurasia and Africa do not fit with their low number of extinctions since man (including 'early man') supposedly coexisted with the megafauna for hundreds of thousands of years. So, overkill advocates need to explain this away, which they do (see below). To compensate, overkill enthusiasts point to Australia and the Americas as the primary evidence for their view.

Dating contradictions

However, the timing of man's entry and of the extinctions in Australia and the Americas depend strongly on *precise* dating, which presents another problem. Looking back into the history of the debate, overkill advocates seem to have chosen dates that support their hypothesis and given what seem like legitimate reasons for tossing out dates from carbon-14 and other methods that don't.

For instance, Boulanger and Lyman eliminated 46 carbon-14 dates and kept 69 in their analysis of the abundant megafauna in the northeast United States and southeast Canada.⁶ Zazula *et al.* dismiss carbon-14 dates as young as 20,000 years ago on the Ice Age camel in Alaska because of the supposed lack of browse vegetation at that time, but they find new dates of around 50,000 years when they think browse vegetation was plentiful.⁷ They also rejected carbon-14 dates as young as 18,000 years on mastodon bones in Alaska and the Yukon Territory of Canada because of the supposed lack of browse vegetation.⁸ Most of the new dates for mastodons then 'agreed' with 50,000 years or older.

Table 1. Percentage of mammalian megafauna over 44 kg (100 lb) that went extinct during and around the late Pleistocene.^{2–4} Southern Eurasia is not included because of insufficient data.

Continent	Percent extinct
Africa	25%
Australia	88%
Northern Eurasia	36%
Northern America	72%
South America	83%

The dates of Australian extinctions are also sometimes rejected if they disagree with researcher ideas. This was done with dates younger than 28,000 years for megafauna extinction:

“But one reanalysis has shown that all megafaunal ¹⁴C dates younger than 28,000 years were invalidated either by doubtful association of dated samples with megafaunal bones themselves or by difficulties of ¹⁴C dating near its limit.”⁹

Notice the reasons for the dismissals: (1) the dates did not agree with the paleontology and (2) they suspected errors of contamination, the usual claim for older discarded carbon-14 dates. However, dates of less than 28,000 years are far from the dating limit of carbon-14, which is usually around 50,000 years, although some researchers have pushed the method to 60,000 to 70,000 years ago.

Circular reasoning

Circular reasoning certainly plays a part in all the published dates and events. For example, James Kennett and others, who advocate extinction by a late Pleistocene comet or asteroid impact, claim, “Out-of-sequence ¹⁴C dates are a common dating problem that is solved by discounting outlying young dates.”¹⁰ In other words, dates from carbon-14 and other methods are eliminated if they do not agree with their preconceived narrative.

Major strengths and problems for overkill

Overkill advocates point out that the small populations of man entering Australia and the Americas, mostly with spears and stone knives, could not wipe out so many large mammals, most of which were non-prey animals. The climate was radically changing at the time, so they blame the extinctions on climate change. This works well for North America at the end of the Ice Age, but South America

supposedly experienced only weak climate change at the end of the Pleistocene. However, South America was one of the continents hardest hit, with 83% of its megafauna going extinct.

Moreover, the timing for overkill is off for Australia, since they believe man entered only about 45–60 ka ago, when the major climate change would have been at about 20–30 ka near glacial maximum. Overkill advocates counter this by inventing a climate change episode soon after man entered Australia.

Of course, overkill advocates point to Africa and Eurasia as contradictions to overkill, as stated above. Then they point out that there are only two human/megafaunal associations in New Guinea and Australia and about 14 in North America—way too few to provide evidence for overkill.¹¹ But overkill advocates point out that such low numbers of man/megafauna associations are what they ‘expect’ because the older the associations the faster they should disappear from the archaeological record.¹²

Each side is deeply entrenched into their position, which is why the sometimes-acrimonious debate has lasted 200 years, and why there does not seem to be any possible solution in sight. Enter the ‘Controversy Space Model’ (CSM) to help ‘solve’ the problem.

The CSM model to the rescue

The CSM is an arbitration model and is supposed to work by first finding common ground of theoretical agreements between opponents, then ‘refocusing’ and ‘solving’ small chunks of the problem, called a ‘conceptual blockage’, and moving onto the next question in a step-by-step manner.¹³ The authors of this model have high hope of eventually settling the dispute by modelling: “we can contribute to the solution of the conceptual blockage by means of mathematical and simulation models”.¹⁴

To show how ‘successful’ the CSM has worked in the past, the authors go back into history to show how questions arose, were debated, and were solved (table 2), starting with the dispute over the origin of fossils.

Some questions were correctly solved, such as the nature of fossils as once living organisms. This good start would seem to add confidence for the solving of later conceptual blockages. However, in some of the ‘settled’ questions, biblical earth history comes off as a stopper to ‘progress’. In deciding the cause of extinctions, they solve a ‘straw man’:

“The disappearance of species from the planet was in direct conflict with the notion of a ‘perfect creation’, that stated that living beings had been created a single time, and were meant to exist forever.”¹⁶

This is untrue. All the authors needed to do was read the early chapters of Genesis to discover in chapter 3 that because of sin creation is no longer perfect, and to read Genesis 6–9 to discover the real cause of extinctions.

Table 2. Major episodes of the ‘Controversy Space Model’, simplified and taken from table 1 in Monjeau *et al.*¹⁵

Dates	Major questions	Conceptual blockage	Unblocking decision
About 1565	Nature of fossils	Organic or created in situ	Organic
1665–1795	Local vs global extinctions	Naturalistic vs creation and catastrophism	Many naturalistic global extinctions
1795–1830	Age of the earth	Uniformitarianism vs biblical timescale	‘Discovery’ of deep time
1810–1863	Natural or divine causes	Creation vs evolution	Uniformitarianism and evolution
1863–present	Search for a cause of extinction	Mainly overkill and overkill	Unresolved

Regarding ‘settling’ the question of the age of the earth, they confidently assert:

“Within this framework, an important conceptual blockage that got in the way of the debate’s advance was the uncertainty regarding the age of the Earth, spanning around six thousand years (Ussher, 1650), a very short period to easily accommodate any explanation regarding extinctions.”¹⁶

They think that a greatly expanded timescale, along with evolution and uniformitarianism, will solve their many mysteries, including the end-Pleistocene mass extinction.

The failure to solve the mystery

As they go on in their historical summary, emphasizing the heroes of the so-called Enlightenment that resulted in the ‘unblocking’, they come to a major conceptual blockage: the actual solving of the problem of end-Pleistocene extinctions. They summarize:

“Nowadays, the controversy space on the causes of megafauna extinction is suffering a period of conceptual blockage. This may be because the authors are clustered around the two major paradigms (environmental versus anthropic causes ...) in a sometimes, inflexible disputational fashion ... This controversy space is one of the most passionate debates of science, resembling fans of a soccer team or pre-election bids between political parties.”¹⁴

They have been stuck on this conceptual blockage for almost 200 years! You would think they would back up and see if maybe they made the wrong unblocking decisions.

Post-Flood Ice Age solution

If they return to biblical earth history, they would discover there is a clear explanation for extinctions.^{17,18}

The global Flood described in Genesis is the only viable explanation for an Ice Age. Since there was only one global Flood,¹⁹ there was only one Ice Age.^{20,21} Indeed, the fact that such a mass extinction occurred *only* after the ‘last’ ice age argues strongly against any previous ice ages. If there were many previous ice ages of comparable severity and duration,

why is it that mass extinctions only occur at the end of the last ice age? This solves the issue of the lack of extinctions after their supposed earlier 49 ice ages.

The Ice Age after the Flood was much different than what uniformitarians propose. Instead of ice ages being bitterly cold in the uniformitarian model, winters were actually much warmer due to the warm oceans while summers much cooler due to Flood volcanism and meteorite impacts and post-Flood volcanism. This equable, mild climate with little seasonal contrast occurred early in the Ice Age, contrary to uniformitarian expectations and climate simulations. The disharmonious associations of plants and animals early in the Ice Age, especially the warm-climate types so far north in the Northern Hemisphere, is evidence of such an equable climate, but strongly contrary to uniformitarianism.²² The animals thrived in this equable climate. The abundant moisture and mild temperature combined with rich virgin soil to provide perfect grazing over the middle and high latitudes. The diversity of mammal populations has been described as similar to the Serengeti of Africa.

But the Ice Age was dynamic, changing all the time. By the end of the Ice Age, the climate was drastically different. Summers became warmer while the ice sheets melted. However, winters became even colder than today because of the existence of the ice sheets and the increased sea ice,²³ resulting in a large seasonal contrast. Less-dense fresh water from melting ice caps in the mountains of the high and mid latitudes flooded over the top of salt water in high latitude oceans. This fresh water rapidly froze into sea ice. The greater amount of sea ice, colder sea surface temperatures, and the large ice sheets that formed after the Flood resulted in a drier atmosphere. Colder sea surface temperatures evaporate less water vapour into the atmosphere compared to today, while more sea ice restricts the oceanic evaporation in that area. Drought struck Australia and South America especially hard.

The tropics and subtropics likely warmed to near their present temperatures once copious post-Flood volcanism had ended. The temperature difference between the low latitudes and the mid and high latitudes would be much stronger than today because of the existence of the ice sheets and the increased sea ice. The stronger the temperature difference, the stronger the jet stream by the thermal wind

equation. Therefore, there would be much greater wind during deglaciation. This is supported by the abundant sand and loess, wind-blown silt, associated with the Ice Age.²⁴ Fierce wind and drought would cause fires to rage across large areas of land.

Most of the animals were *not* conditioned to cold winters as uniformitarian scientists think. When the winters became much colder, they were greatly stressed. Drought resulted in less food, which would have a greater impact on the larger and slower-reproducing animals.

Rapid melting of ice and snow would occur in such a climate because of little winter snow. This resulted from less evaporation from a cooler ocean and warmer summer temperatures with much more solar radiation, due to the decrease in stratospheric aerosols. With less winter snow and warming summers, the winter snow easily melts early with most of the warm season dedicated to melting the ice sheet. Meltwater from the glaciers flooded the rivers and streams.

The cold winters in non-glaciated areas at mid and high latitudes would create permafrost, which is known to have been significantly more extensive during deglaciation.²⁵ Since the top of permafrost would melt during the summer and refreeze in the fall and winter, numerous summer bogs would occur south of the ice sheets in the Northern Hemisphere and in non-glaciated areas of high latitude. Bog vegetation is often toxic to grazers, which most end-Pleistocene extinct animals were.

Less forage, cold weather, drought, and winds combined to cause the mass extinctions. Each continent experienced their own unique variations of these factors. The vast majority, if not all, of the mass extinctions were caused by overkill. There are very few associations between megafauna and man, and most of them are found at kill sites. There is no reason for other sites to disappear in the short time since the Ice Age, so overkill had little or nothing to do with the mass extinctions.

Conclusion

Going back in history in the CSM model and changing the wrong unblocking decisions provides a solution to this 200-year mystery. Specifically, reintroducing the biblical Flood and the biblical timeframe allows for a productive solution to this enigma.

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Hydroplate Theory—problems for trench formation in the Pacific Basin

I am responding to Edward Issacs' paper: Hydroplate Theory—problems for trench formation in the Pacific Basin, *J. Creation* 32(3):58–63, 2018.

First, I would like to thank Issacs for his brief summary of Walt Brown's Hydroplate Theory (HPT), which is mostly correct. However, Issacs' entire paper is based on his incorrect claim that HPT requires a trench that is antipodal to the Mid-Atlantic Ridge (MAR) system. As this letter will show, Walt Brown clearly illustrates in his book *In the Beginning* that Issacs' trench system is not part of HPT.¹

Issacs begins building his case by quoting passages from pages 155 and 159 of Brown's book. He claims that they "identify two major locations for trench formation". He then claims that the trenches within the Pacific plate must be antipodal to the MAR.

Brown simply says that much of the Pacific plate, centred around a position opposite the middle of the Atlantic floor, sank and cracked, forming "fractures in millions of places". These fractures are the same 'trenches' referred to in the earlier quote. He does not claim that this subsidence resulted in a major trench system being formed in exact antipodal positions to the Mid-Atlantic Ridge (MAR) as Issacs proposes. In fact, Brown does not even mention the MAR in this context, but merely indicates the centre of the Atlantic floor. Brown goes on to explain that the deepest trenches opened up primarily around the west, north, and east edges of this sinking plate, exactly as one would

expect if a large three-sided 'flap' of the crust subsided and then later was lifted. This is why Brown has no illustrations showing a Central Pacific Trench system and Issacs has had to create his own graphics for his figures 6, 7, and 8. Issacs could have easily seen that he had misinterpreted Brown by examining Brown's own graphic

(figure 83) on the previous page (p. 154), as shown below.

Brown's figure 83 shows the actual location of the edge subsidence trenches as they are today as well as some of the major internal trenches such as the Mariana and Vityaz Trenches. The smaller inset map of the Ring of Fire indicates Brown's

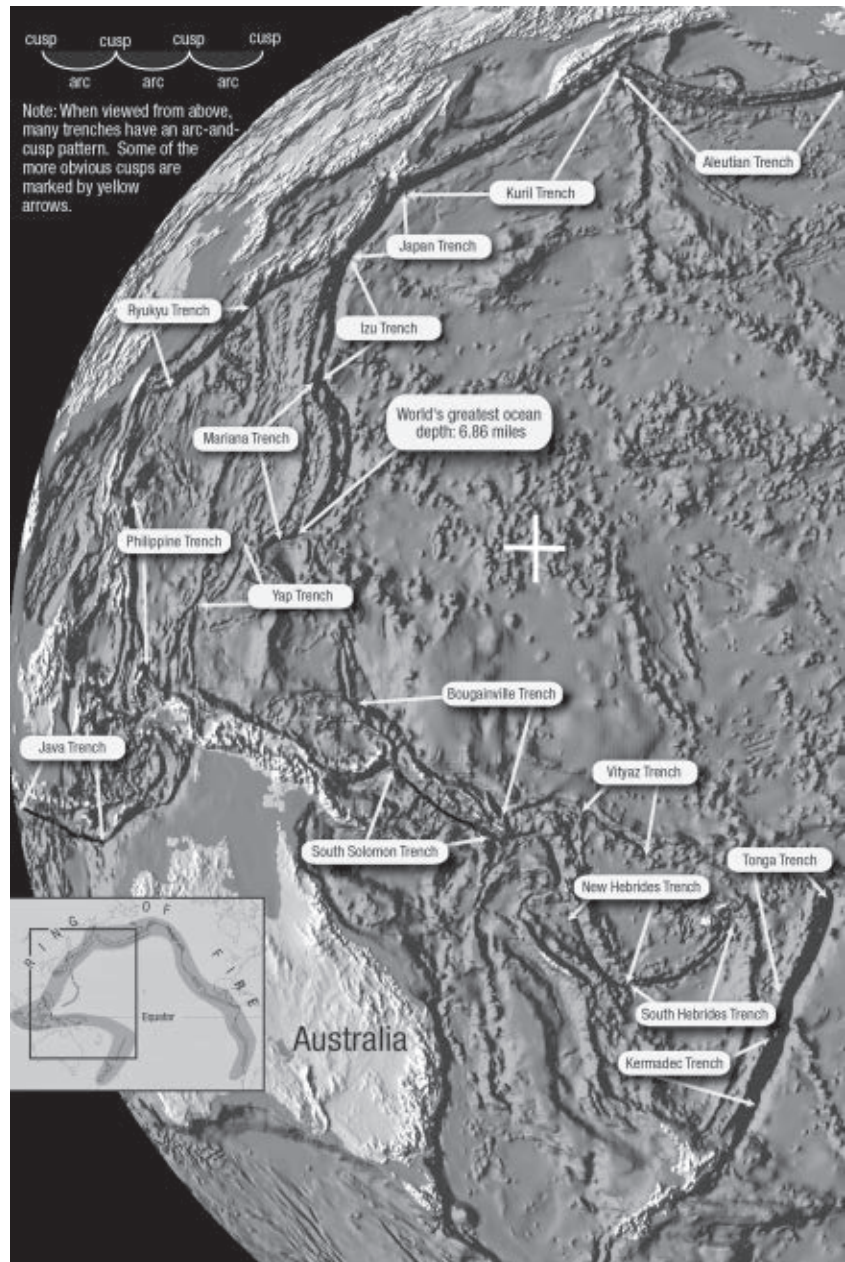


Figure 83. "Trenches of the Western Pacific. Sixteen ocean trenches are concentrated in the western Pacific. Four others are located elsewhere ... The white cross marks the centre of this concentrated trench region ... Why is the centre of this trench region almost exactly opposite the centre of the Atlantic Ocean, both in latitude and longitude?" (Mountain High Maps © 1992–2019 Digital Wisdom Inc.)

proposed edges of the subsided plate. There is also a white cross on the main map. Brown's caption explains that "the white cross marks the centre of this concentrated trench region". This cross, at 10N 159W, is antipodal to 10S 21.5W which Brown identifies on page 161 as the centre of the Atlantic. If one checks this out, one will see that Brown's Atlantic position is about 10° west of the MAR at that latitude. Brown was making no attempt to link his white cross with a specific trench or even its antipode, the MAR, as Issacs is claiming.

The actual Pacific Ridge system that Brown accepts is clearly illustrated in his figure 44, page 114. In the caption below this image, Brown comments: "Also notice the different characteristics of (1) continents and ocean basins, and (2) the Atlantic and Pacific Basins." So he is fully aware that the ridge placements in these two basins are very different. Figure 44 shows a Pacific Ridge, not a trench, formed by similar processes to the Mid-Atlantic Ridge, partly beneath western North America, then extending south from the Baja Peninsula off South America and crossing the South Pacific/Southern Ocean below New Zealand (see p. 127 and its Endnote 49 for confirmation). Brown's theory actually attempts to explain why these basins are very different. He does not impose an antipodal MAR onto the Pacific Basin as Issacs does.

Issacs' figure 4 seems to support his MAR copy claim, as it appears to represent Brown's figure 85. Figure 4 clearly shows a Central Trench Complex and Issacs' caption below says that HPT has a "Central Trench Complex mirroring MAR". Attached below is Brown's

actual figure 85, including its caption. In contrast to Issacs' altered image, there is no mention anywhere of a 'Central Trench Complex' on it, nor anything to suggest that such a complex, if it had ever been proposed by Brown, would mirror the MAR, nor does it identify any other trench complexes. Instead, all three indents are merely marked as trenches, and Brown's actual caption says that the subsiding of the Pacific plate resulting in "fracturing the Pacific plate at thousands of places within the boundaries of the Ring of Fire!" The three trenches in the illustration merely represent some of these fractures in the western section of the Pacific plate, as identified in both versions of this image. Issacs' modifications of Brown's illustration and caption are misleading.

In addition to Issacs' invention of the non-HPT antipodal MAR, his

article has other errors. The caption under his figure 5 claims to show the 'motion of the MAR'. Presumably he means 'position'. In figure 6 he claims to show a mirror image of the MAR superimposed over the Pacific Basin. But it is not a 'flipped' mirror image. It is merely a 'straightened' version of the MAR that has been rotated longitudinally by 180°. In figure 8 he claims to show the antipodal positions of the MAR. But it is only his rotated MAR again. An antipodal MAR would also need to be flipped north to south. And note that Issacs' proposed alternative Mid-Pacific Trench shown in figures 7 and 8 is neither predicted nor required by HPT.

To recap this, Brown did not propose a Mid-Pacific Trench which was an antipodal Mid-Atlantic Ridge. Issacs proposes this, then points out that it does not exist and unreasonably concludes that "These issues challenge

HPT's overall plausibility" In reality, Issacs' 'challenge' is meaningless.

Brown's Hydroplate Theory provides us with a unique, and in my opinion valuable, model of the mechanisms of the Great Flood, and it deserves honest and intelligent discussion.

Bruce Armstrong
Creswick, Vic
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1. Edition 9 of the ebook is used, which was downloaded from: kgov.com/walt-brown-in-the-beginning-pdf-of-the-draft-of-the-9th-edition.

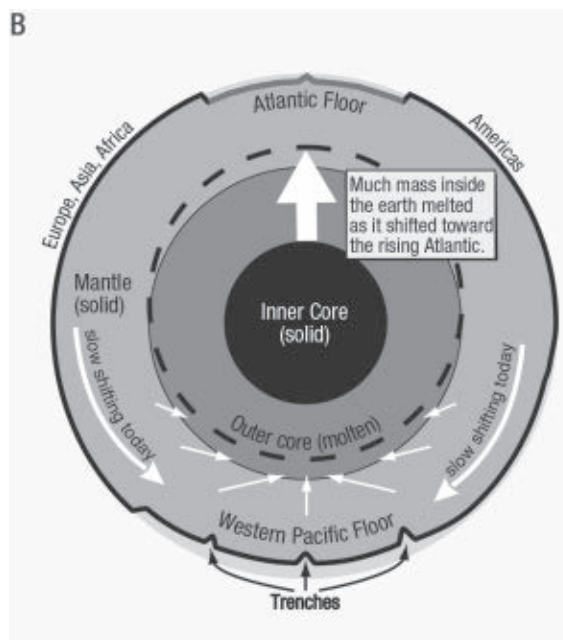


Figure 85. "Hydroplate Explanation for Trenches (Part B). During the flood phase, the escaping subterranean water eroded and thinned the preflood crust to a thickness of about 48 km. Frictional heating from movements near the centre of the earth began melting solid rock which then contracted This caused the crust on the Pacific side of the earth... to subside by at least 48 km, fracturing the Pacific plate at thousands of places within the boundaries of the Ring of Fire!" (Mountain High Maps © 1992–2019 Digital Wisdom Inc.)

» **Edward Isaacs responds:**

I am grateful to Bruce Armstrong for his letter responding to my recent article “Hydroplate Theory—problems for trench formation in the Pacific Basin.”¹ In his letter, he displays two primary concerns that: 1) Hydroplate Theory (HPT) neither predicts a Pacific Central Trench Complex (CTC) nor expects any correlation between trench formation and the Mid-Atlantic Ridge (MAR); and 2) the orientation of the predicted trenches in my figures 6 and 8 should be reversed North-South. I believe he has some misunderstanding regarding my critique, as my focus was on trench formation and not Pacific oceanic ridges.²

Correlation between MAR and Pacific Trench formation

Armstrong opines that Dr Walt Brown³ makes no correlation between trench formation and the MAR, stating that instead it correlates to the “middle of the Atlantic floor”. However, this assertion does not consider Brown’s multiple statements contrary to Armstrong’s position.⁴ Armstrong’s publication of Brown’s figure 85 also counters his claims by showing a Pacific Trench mirroring the MAR. HPT postulates the Atlantic floor rose *because* of the MAR.⁵ Thus, up-buckling of the Atlantic floor will centre around the MAR, the MAR constituting the area of greatest deformation and uplift and primary cause of the Pacific hydroplate’s subsidence.

The CTC—postulate of HPT

Armstrong also misses statements by Brown identifying the two distinct processes believed to have produced trenches. First, “Portions of the Pacific crust *directly opposite* the centre of the rising Atlantic floor buckled inward, forming [CTC] trenches.”^{6,7} Because of the resulting instability, the Pacific plate “rapidly subsided and sheared

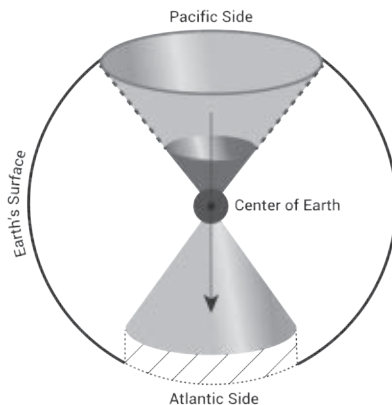


Figure 1. Diagram portraying Hydroplate Theory’s mechanism for producing the Ring of Fire and associated trenches. Brown’s original caption explains that, “shrinkage within the yellow cone region caused the sides of the gray [sic] Pacific cone (marked by the dashed red line) to shear. This produced the Ring of Fire [the Boundary Trench Complex], shown in green ...”. Thus, HPT predicts a Mid-Pacific Central Trench Complex, despite the challenges against such a position.¹ (From Brown, ref. 3, figure 89, p. 160.)

around its perimeter”, producing the Ring of Fire or the Boundary Trench Complex (figure 1).⁸ Thus, HPT predicts both the CTC and Boundary Trench Complex (BTC).

My figure 8 showing the location of a Mid-Pacific CTC is an important graphic defending the idea that the Western Pacific Trenches cannot comprise HPT’s predicted CTC

because: 1) the Eastern and Western BTC should be equidistant from the CTC, thus a Western Pacific CTC would cause the BTC to extend 260° across Earth; 2) the Tonga Trench tomography shows a pattern more consistent with shearing along the hydroplate’s perimeter than with fracturing resulting from intra-plate down-buckling; and 3) Brown states the Ring of Fire formed from peripheral shearing (figure 1).⁸ Thus, the Western Pacific Trenches must comprise the Western BTC. Because the CTC would be approximately equidistant from the Western and Eastern BTC, a Mid-Pacific CTC would be required, despite the serious challenges against it.¹

CTC—rotated image of MAR

It is true that if my plotted points were true antipodes⁹ to specific points corresponding to the MAR, then the predicted location of the trench region would have to be inverted North-South. However, my figure 6 shows the MAR rotated 180° latitudinally because HPT states that Pacific Trenches were formed by *subsidence* and not antipodal lateral force. Additionally, any antipodal movement

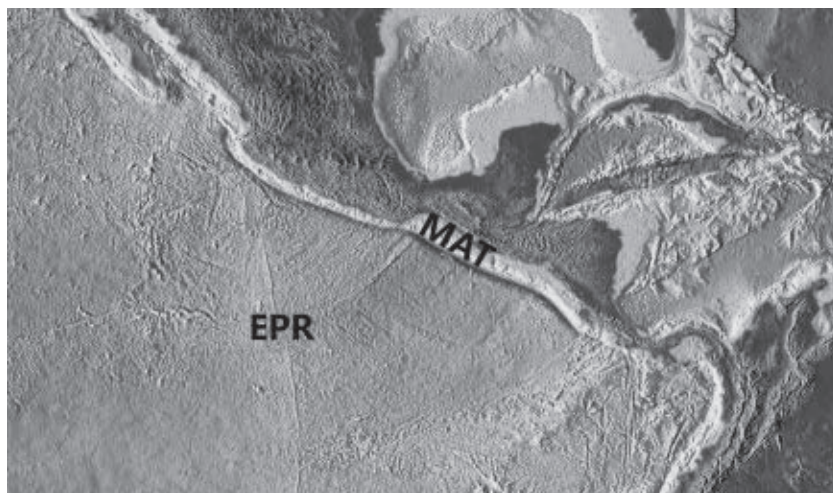


Figure 2. Depiction of the East Pacific Rise (EPR) and its near proximity to the Middle America Trench (MAT). Observe that the EPR is located west of the MAT on Hydroplate Theory’s predicted Pacific hydroplate. Adapted from an image in the public domain.

would cancel into unidirectional horizontal motion. Thus, the CTC will necessarily be a rotated image of the MAR.

Misstatements and more challenges to HPT

I contend that Armstrong's letter contains several misstatements. He states the configuration of the Pacific Basin is "exactly as one would expect if a large three-sided 'flap' of the crust subsided [to form trenches] and then later was lifted [to form oceanic ridges]." However, this disregards HPT's claim that oceanic ridges such as the MAR resulted from the chamber floor up-buckling from the removal of overlying hydroplates. An oceanic ridge cannot transfer onto a hydroplate because the hydroplates are detached from the chamber floor, and any surface expression of a ridge underlying the hydroplate would be minimal. HPT proposes the North American hydroplate slid away from the rising MAR and overrode an even larger oceanic ridge in the Pacific (the East Pacific Rise), despite the lack of both a demonstrated mechanism and any surface expression of an underlying ridge evident on the hydroplate.¹⁰ Additionally, the chamber floor supposedly up-buckled from the loss of overburden, in spite of the Pacific hydroplate being weighted by extrusives. Thus, no oceanic ridge should have formed on the Pacific hydroplate. Nevertheless, this is also contradicted in the Pacific, because the East Pacific Rise off Central America is *west* of the Middle America Trench (a BTC¹¹) on HPT's predicted hydroplate, contradicting HPT expectations (figure 2). Therefore, the Pacific Basin is even more challenging to HPT than noted in my original paper.

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References

1. Isaacs, E., Hydroplate Theory—problems for trench formation in the Pacific Basin, *J. Creation*, 32(3):58–63, 2018.
2. The only mentions of Pacific oceanic ridges were on the incorrect association of the Pacific Trenches to oceanic ridges. See Isaacs, ref. 1.
3. Brown, W.T., *In The Beginning: Compelling evidence for creation and the Flood*, 9th edn, Center for Scientific Creation, Phoenix, AZ, 2018.
4. For example: "As the Mid-Atlantic Ridge and Atlantic floor rose, mass had to shift within the earth toward the Atlantic" (p. 135); "the Mid-Atlantic Ridge started to buckle up... . This steadily removed gigantic amounts of weight from what would become the Atlantic floor, so the ridge and chamber floor rose even faster. Material within the earth then had to shift toward the Atlantic side" (p. 153); "the bulging of the chamber floor in what was to become the Mid-Atlantic Ridge, this bulging produced movements deep within the earth that resulted in deep faulting (shearing), frictional heat, and melting ... [causing] the resulting subsidence of the Pacific plate" (p. 166). See Brown, ref. 3.
5. "... one portion of the exposed chamber floor will buckle up before all the others Lift[ing] the adjacent portions of the exposed chamber floor". See Brown, W., *The Flood Science Review*; in: Bardwell, J. (Ed.), Jesus Name Productions, p. 440, 2011.
6. Brown, ref. 3, p. 153. Italics mine.
7. This is corroborated by similar statements that: "A corresponding depression [to the rising MAR] had to occur on the opposite side of the earth", HPT's answer to the question of how trenches were primarily concentrated in the western Pacific. See Brown, ref. 3, p. 177.
8. Brown, ref. 3, p. 157.
9. On Earth, an antipode is a point that is colinear with a second point such that the line transects the centre of Earth.
10. HPT proposes that the rising of the MAR coupled with the lubricating effects of the underlying supercritical water caused the hydroplates to slide toward the Pacific away from the MAR. However, it would be impossible for the North American hydroplate to override a Pacific Ridge (the East Pacific Rise) that is larger than the one it slid off (the MAR).
11. "Therefore, the Pacific plate, lacking support, rapidly subsided and sheared around its perimeter—now called the Ring of Fire." Brown, ref. 3, p. 157.

Orang-outang or *Homo sylvestris*: ape-men before Darwin

Andrew Sibley

This paper discusses the presence of belief in ape-men, and ape-women, prior to Darwin. Beliefs regarding various mythological creatures with human-like physical form were present in antiquity, but persisted even into the 18th century, and displayed in drawings of various quality. Lack of knowledge was filled in with speculation from mythology and influenced early science. For instance, poor quality drawings of Egyptian baboons became corrupted and modified in 17th and 18th century images, with their subsequent depiction as loose-living forest-dwelling people, sometimes known as *satyrs*, *orang-outangs*, or *Homo sylvestris*. Such speculation was even present in the work of Carl Linnaeus, and graphically illustrated by one of his students. With some controversy, Linnaeus placed apes and monkeys in the genus *Homo* and he tried to identify several missing links as part of an Aristotelian chain of being between apes and human beings. Linnaeus still believed in special creation, but others in the 18th century, such as Lord Monboddoo, in contrast to Linnaeus argued for an evolutionary progression from ape to man. However, the evolution of man was rejected by Comte de Buffon and Peter Camper on the basis of direct studies of apes and belief in the divine uniqueness of human beings.

The belief that human beings evolved from apes developed among some European academics in the late 18th century, and not originally with Darwin in the 19th century. But careless thinking about this subject in the 18th century prepared the ground for Darwin's theory. Historical testimony suggests that popular mythology from antiquity, and its influence upon scientific discourse, had already primed European minds to accept the idea of evolution of man from apes. This paper examines the rise of belief in ape-men (and ape-women) at a time when such popular mythology and speculation filled-in the many gaps left by a lack of knowledge. Poor drawings of the few available specimens were also copied and embellished over several centuries, thus compounding the problem.

Firstly, beliefs relating to strange creatures from antiquity will be outlined, via Pliny's *Natural History* and Augustine's *City of God*. Then consideration will be given to developments in the early modern period, followed by the flawed classification scheme set out by Linnaeus, and erroneously portrayed in drawings by his student Hoppius in the 18th century (figure 1). This was, perhaps unwittingly, one of the first ever ape-to-man comparative drawings, but without belief in an evolutionary progression. The scheme was based upon the Aristotelian great-chain-of-being, albeit still in the context of special creation. Lord Monboddoo on the other hand argued for an evolutionary progression from ape to man, but this idea was rejected by Comte de Buffon and Peter Camper on the basis of empirical studies, human intelligence, and lack of capability for complex language.

Beliefs from ancient Greece and Asia

Accounts of strange human-like creatures or human beings with severe physical deformities are found in works from antiquity. Pliny, a first century Roman author, relayed accounts from the then-known world in his *Natural History*. The *Sciapodas* or *Monocoli* were considered to possess one leg, but with large feet with which to shade from the sun, while the *Pygmies* were a race of dwarf humans, often engaged in struggle with cranes. The *Satyrs*, from the mountains of western India, were said to sometimes run on two legs, sometimes on four, but were very swift. They were also referred to as forest-people, or wild people (Latin: *gentem silvestrem*), covered in hair with striking eyes and dog-like teeth, unable to speak, but only screech (Latin: *sine voce, stridoris horrendi*).¹ It is likely that Pliny was relaying eyewitness sightings of apes, but the satyrs of ancient Greece were god-like creatures; half-human and half-animal, with the legs and ears of goats or horses.²

In the early Christian period Augustine set out a clear demarcation between Adam's lineage, mythical creatures and non-human animals. His discussion included the pigmies, *hermaphrodites*, *cynocephali*, and *skiopodes*, and known animals of apes (*simias*), monkeys (*cercopithecus*), and *sphingas*. And he was skeptical of some of the incredible reports, wondering whether they were in fact accurate. He commented:

"But whoever is anywhere born a man, that is, a rational, mortal animal, no matter what unusual appearance he presents in color, movement, sound, nor how peculiar he is in some power, part, or quality



Figure 1. From left to right *TROGLODYTA* Boentii, *LUCIFER* Aldrouandi, *SATYRUS* Tulpii, *PYGMAEUS* Edwardi, from Hoppius' academic dissertation *Anthropomorpha*, 1760, published by Linnaeus 1763. The illustrations gradually become more ape-like, with increasing crouch, an increasingly ape-like head, and more ape-like hands and feet.



Figure 2. From left to right: (a) Breydenbach's ape from 1486 in *Peregrinatio in Terram Sanctum*; (b) Gesner's ape or hairy satyr, in *Medici Tigurini Historiae Animalium*, 1551; (c) Aldrouandi's image of *Cercopithecus Formae Rarae* 1637 in *De Quadrupedibus Digitatis Viviparis*; (d) Hoppius' more human-like drawing in *Anthropomorpha*, 1763. Note how much more human-like Hoppius' drawing (right) is, in terms of face and feet, compared to Breydenbach's image (left), probably of an Egyptian baboon.

of his nature, no Christian can doubt that he springs from that one protoplast [Adam].”³

Augustine commented further that if one did not already know that “apes, and monkeys, and sphingas” are not human but animals, then some “historians would possibly describe them as races of men, and flaunt with impunity their false and vainglorious discoveries.”⁴ Augustine correctly identified the pigmies as a tribe of humans and their small stature did not take away from their genetic connection to Adam.

In subsequent centuries, belief in the existence of *satyrs* or *Homo sylvestris* persisted (Latin: *sylvestris*—of the forest). The testimony of foreign traders and seamen also relayed fabulous stories from indigenous people living in distant lands, and these accounts subsequently passed into the academic imagination. While in Asia, beliefs about god-like men and women arose, sometimes with ape-like features.

They were referred to as *Vanara* in India (*vana*: forest, and *nara*: man), and usually depicted as human, but with the heads of monkeys. They were believed to have some supernatural powers, and so became entwined with the Hindu pantheon. The Chinese believed in a god-like monkey king, Sun Wukong, said to be born from a stone, and possessing great strength and magical powers.⁵ Further east, the Indonesians held that there existed ape-human hybrids that lived in the jungle. The name given was *orang-outang*, meaning man-of-the-woods (*orang*: person, *outang*: forest), but in reality, they were probably a reference to the orangutan animal.⁶

Belief in ape-man during the early modern period

Few specimens of apes from Africa and Asia arrived in Europe during the early modern period, allowing confused speculation as to the nature of these animals to grow. Some knowledge of apes and monkeys was known from antiquity in Europe from their connections to India, Egypt, and North Africa. But much of this knowledge was understood through hearsay, influenced by speculation from mythology and sometimes imaginative illustrations.⁷

In the 16th century one of the best illustrated works on zoology was Conrad Gesner's *Historia Animalium*, first published in 1551. This book depicted many exotic animals with remarkable accuracy, including monkeys and apes. Mixed in with these was an illustration of a large monkey (*Cercopithecus*) that was a virtual copy of Breydenbach's image of 1486, a long-tailed monkey standing with the stature and form of a man with human-like arms and legs, holding a staff and leading a camel (figure 2). Gesner referred to his drawing as a hairy satyr with human-like form. The words underneath Breydenbach's drawing “Non constat de noīe [nomine]” implied there was no agreement about the name of the animal.⁸ Breydenbach's image was possibly derived from an ancient Egyptian iconography of the god Thoth, sometimes portrayed as a baboon with a staff.⁹ It may also be a rather poor illustration of the hamadryas baboon (*Papio hamadryas*) (figure 3). Gesner also used the

testimony of ancient Greek scholars such as Megasthenes, who referenced observations of monkeys in India, and like Breydenbach illustrated his drawing with the face of an ape.¹⁰

In the early 17th and 18th centuries apes and monkeys from various continents were collectively known as *orang-outang*, with much speculation as to their origins. Dutch anatomist, Nichalaas Tulp, had the opportunity to examine either a chimpanzee or bonobo that had been brought back on a trading ship, most likely from Angola, but with doubt as to its origin. This was a gift for the pleasure of the Prince of Orange, Frederick Henry. Tulp referred to this animal as an *orang-outang* (from the Malay language) or *Homo sylvestris*. He gave the specimen the name *Satyrus indicus*, thus adding some confusion regarding its true nature, but evidently with influence from Pliny's description. The image (figure 4a) appeared in *Observationes Medicae*, sometimes referred to as a *book of monsters* because of its graphical depiction of various physical disorders, published in 1652.¹¹ Another book of monsters was published in 1642 by Ulysses Aldrouandi entitled *Monstrorum Historia*. Aldrouandi depicted (as male and female) the *Cinnaminiae gentis*, a dark-coloured human being covered in hair, which he described as “*hominum sylvestrium*”; that is wild man of the forest (figure 4b). He placed the satyrs in the same group, and depicted various forms including goat-footed and feline forms.

Jacob de Bondt (Jacobus Bontius), from his travels to Java, also graphically illustrated an ‘Ourang Outang,’ or wood-man (*Homo silvestris*) with the characteristics of a hairy human female, remarkably similar to that of Aldrouandi (figure 4c).¹² This work was written in 1631, but first published by Willem Piso in 1658, after Bondt's death, and after Tulp's account of the chimpanzee. Similar terminology was used for apparently very different creatures by Bondt and Tulp. Bondt claimed to have seen first-hand both sexes walking on two feet, and that the females showed some human emotions and modesty. These beings he likened to the satyrs of Pliny, believing further that they were actually human-ape hybrids. He relayed indigenous claims that they



Image: British Museum; Steven G. Johnson/CC BY-SA 3.0



Image: Rufus46/CC BY-SA 3.0

Figure 3. (left) The Egyptian god Thoth portrayed as a quartzite sculpted baboon; (right) Hamadryas baboon *Papio hamadryas*. A male in captivity, Tierpark Hellabrunn, Munchen, Germany



Figure 4. From left to right: (a) Tulp's drawing of his orang-outang in *Observationes Medicae* 1652; (b) Aldrouandi's female *Homo sylvestris*—foemina cinnaminiae gentis in *Monstrorum Historia* 1642; (c) Bondt's drawing of an orang outang in *Account of the Diseases, Natural History...* 1658; (d) Hoppius' *TROGLODYTA Boentii in Anthropomorpha*, 1763.

could talk, but merely did not want to out of fear of forced labour, although he likely copied such claims from Richard Jobson's *The Golden Trade* (1623).¹³ Bondt's sightings, if real, were most probably of the orangutans, but he appears to have borrowed from other authors. More significantly, Jenson noted that Bondt's drawing, evidently adapted from the images of Aldrouandi, Genser, and Breydenbach, had an extraordinary career as an illustration in zoological literature across Europe, over a period of two centuries.^{14,9}

In England in 1698 Edward Tyson, an anatomist and member of the Royal Society, had an opportunity to dissect an imported chimpanzee, referring to it as a pygmie. He compared his dissection with human anatomy, and existing knowledge gained from studies of apes (albeit not especially accurate ones). He concluded that his specimen was probably the closest possible link between ape and man. He thought

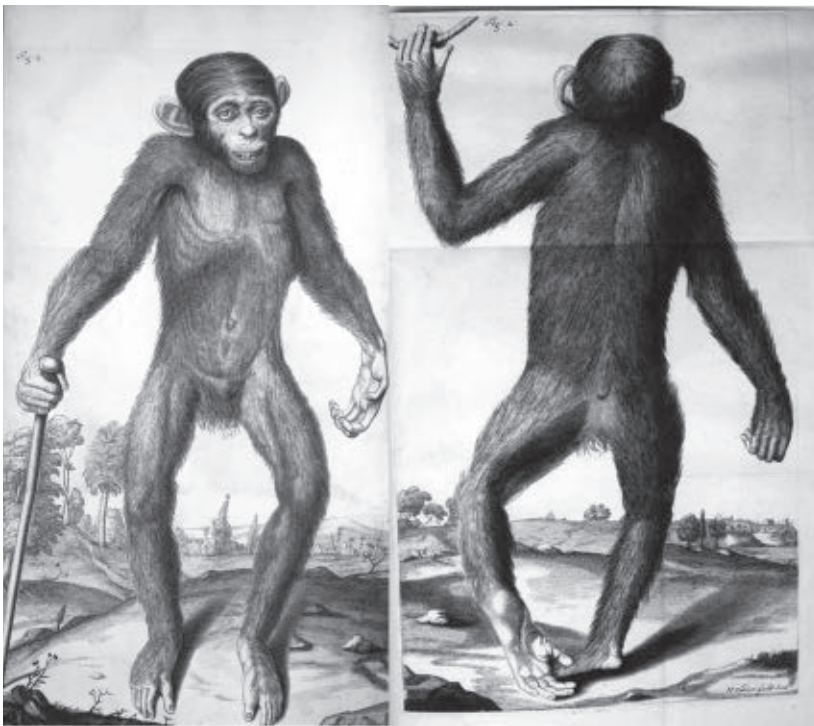


Figure 5. Tyson's Pygmy in *Orang-Outang, sive Homo sylvestris...*, 1699



Figure 6. William Smith's Mandrill in *A New Voyage of Guinea*, 1744

it was able to walk upright, had speech organs similar to humans, and a sizeable brain, but at the same time it was still an animal because there was no evidence that it was capable of speech.

“... that tho’ our *Pygmy* has many Advantages above the rest of it’s [sic] *Species*, yet I still think it but a sort of *Ape* and a meer [sic] *Brute*; and as the *Proverb* has it..., *An Ape is an Ape, tho’ finely clad* [emphasis in original].”¹⁵

His colleague, William Cowper, graphically portrayed it with some human-like appearance standing with a stick (figure 5). But the overall view of Tyson was that the orang-outangs and pygmies were animals and not human, despite drawing comparisons between the two. In fact, he wrote that all claims of strange creatures from ancient Greece were probably sightings of apes or monkeys, and that conclusion should have been the end of the matter for science.

“I shall accordingly endeavour to make it appear, that not only the Pygmies of the Ancients, but also the Cynocephali, and Satyrs and Sphinges were only Apes or Monkeys, not Men, as they have been represented.”¹⁶

Unfortunately, by calling his specimen a pygmy he blurred the distinction between apes and humans. The pygmy seems to have been understood from antiquity as a tribe of dwarf humans. And the accuracy of his work was called into question by Peter Camper (discussed below). The later drawing of the mandrill by William Smith (*A New Voyage of Guinea*, 1744), also helped to keep alive belief in human-like creatures that lived in the forest through the 18th century (figure 6).

Linnaeus

The connection between apes and human beings was strengthened by Linnaeus’ developing classification from 1735 to 1758.¹⁷ He considered that his endeavour, as a believer in special creation, was to function as a second Adam in naming animals and plants, and placing them within an intelligently

designed plan. His plan was however influenced by the Aristotelian great-chain-of-being in which there could be no missing links. It was a hierarchical system and not evidence of an evolutionary progression, but he believed there were designed “missing links” between apes and human beings; links that he intended to identify.

Controversially, in his 1758 classification the genus *Homo* was placed within the Primate order, and broken down into two subgenera, which were *Homo diurnus* and

Homo nocturnus (*Homo troglodytes*). The latter included the orang-outang as described by Bondt, and other apes and chimpanzees. The orang-outang or *Homo sylvestris* was said by Linnaeus to only come out at night, was covered in white hair and possessed a cat-like third eyelid (*Membrana nictitante*). He repeated claims by Bondt and Kjoep that it could even speak, but only with a hissing tone.¹⁸

Homo diurnus was subdivided into *Homo sapiens*, *Homo monstrosus*, and *Homo ferus*, thus including separate references to feral children and severely disabled human beings. But the more controversial aspect of this plan was placing monkeys and apes within the genus *Homo*, thus seemingly removing the distinction between animals and man, with loss of the uniqueness of man as the divine image bearer.¹⁹ In his thinking, the divine image in man was an invisible spiritual quality, while his classification scheme stressed anatomical similarities between apes and man without reference to sacred texts.

At this time exaggerated popular references to imaginary beasts were still informing science, and the uniqueness of human beings was being undermined by naturalistic commitments in science. John Locke had considered that attempts at classifying human beings were often arbitrary and based upon inadequate subjective criteria, although he recognised the uniqueness of human language and the distinctiveness of complex reasoning.²⁰ But the separation of mankind from the other animals using only natural means became very problematic within the context of naturalism, especially when physical or mental defects, that may limit stature or rational ability, were considered.

Linnaeus' scheme was illustrated further in 1760 by four images presented under the title *Anthropomorpha* by Linnaeus' student Christian Emmanuel Hoppius as part of his academic dissertation (figure 1).²¹ The term *Anthropomorpha* was, incidentally, first coined in 1693 by John Ray to denote 'nail



Figure 7. (left) Chimpanzee engraving by Scotin II, 1738 (British Museum collection); (right) Hoppius' SATYR Tulpii in *Anthropomorpha*, 1763—note the more human-like face.



Figure 8. (left) Edward's man-of-the-woods, in *Gleanings of Natural History*, 1758; (right) Hoppius' drawing of PYGMAEUS EDWARDI, in *Anthropomorpha*, 1763.

bearing' or 'anthropoid' animals, although humans were excluded by Ray because of his belief in the sacredness of humanity.²² Hoppius' dissertation was overseen and published by Linnaeus, which suggests it reflected Linnaeus' view

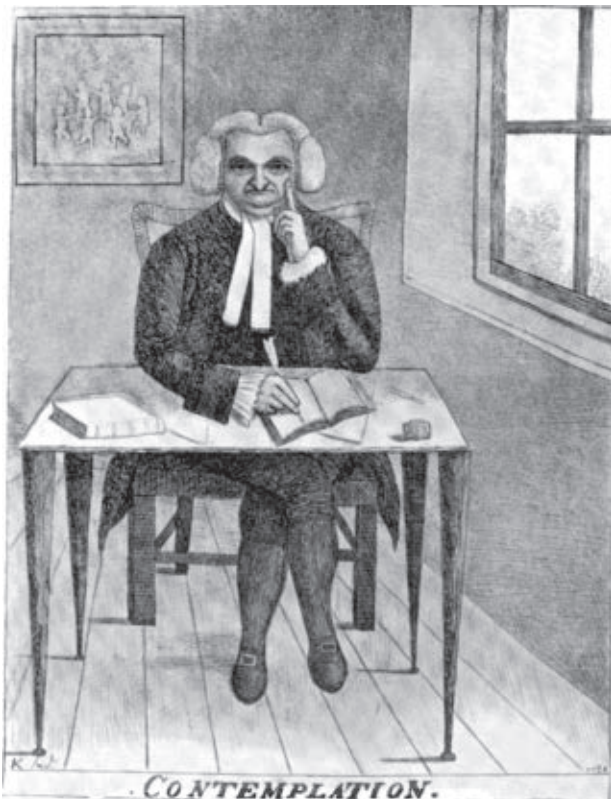


Figure 9. Caricature of James Burnett, also known as Lord Monboddo (1714–1799), by John Kay, in Knight W.A. *Lord Monboddo and Some of His Contemporaries*, London, J. Murray, 1900.

regarding these entities, as Thomas Huxley later suggested.²³ From left to right the illustrations gradually become more ape-like: with increasing crouch, an increasingly ape-like head, and more ape-like hands and feet (figure 1). They were named: *TROGLODYTA Boentii*, *LUCIFER Aldrouandi*, *SATYRUS Tulpai*, and *PYGMAEUS Edwardi*. While the Hoppius' drawings were not considered to be an evolutionary progression by Linnaeus, the images seem to have been falsely and imaginatively modified from earlier drawings to fit into his scheme.

The first image on the left (figure 1) was called *TROGLODYTA Boentii*. This image was modified from Bondt's imaginary impression of the orang-outang; a forest-dwelling creature that he considered to be an ape-human cross-breed. Hoppius modified Bondt's impression to give it shorter hair (figure 4). Brown suggests Bondt's image was influenced by Gessner's drawing of 1551 in *Historiae Animalium*, and Breydenbach's sketch of 1486 in *Pilgrimage to the Holy Land*, although there is also some commonality with Aldrouandi's work. Linnaeus considered that this creature was a species of *Homo nocturnus*.²⁴

The second image from the left (figure 1) was entitled *LUCIFER Aldrouandi*, primarily influenced by Gesner and Breydenbach's drawings (figure 2). However, the given

name is perhaps a reference to a 1637 copy by Aldrouandi.²⁵ The earlier drawing of Breydenbach was most probably that of a baboon: Brown suggests that Breydenbach's image is possibly derived from ancient Egyptian iconography of Thoth, often portrayed as a baboon with a staff.⁷ Hoppius referred to it as a cat-tailed person, and Aldrouandi's image does contain feline features, as also did one of Aldrouandi's satyrs in *Monstrorum Historia*. Linnaeus considered it to be *Homo caudatus*; a tailed third species of man.²⁶ The clearly ape-like face and feet of the earlier drawings have been modified by Hoppius into a more human-like impression, and was used to fit Linnaeus' scheme. So, Breydenbach's baboon became almost human.

The third image from the left (figure 1) *SATYRUS Tulpai* is adapted from an engraving by G rald Jean Baptiste Scotin's II, clearly marked as a chimpanzee in 1738 (figure 7). The graphic impression drawn by Hoppius depicts more human-like features, but without the teacup. Linnaeus considered it might be the species *Satyrsus sylvestris*.

The fourth image on the right (figure 1) is *PYGMAEUS Edwardi*, which is a copy of George Edwards Man-of-the-Woods (figure 8).²⁷ This is a drawing of the animal that Tyson had described, which he noted was known as the chimpanzee from Africa. Edwards thought he could offer a more accurate drawing, but also relayed reports of satyrs or orang-outangs from Asia, which he speculated might be more human-like than his chimpanzee.

Comte de Buffon and Lord Monboddo

Buffon challenged Linnaeus' views on the basis of his own study of apes, possessing a live specimen from Africa (called *Jocko* or *Enjocko* from the Congo), but he relied upon the reports of travellers for the large orang-outang from Asia (this animal he called *Pongo*).²⁸ His *Jocko* did not speak, not even in a hissing tone, and displayed no more intelligence than a well-trained dog, despite having some superficial similarity to humans.²⁹ Because Linnaeus also relied on reports from Bondt and Kjoep, Buffon doubted that sightings of the large orang-outang had been made accurately, or speculated that the creature with its white skin and hair was an African albino.

Buffon's study was apparently set against an evolutionary connection between humankind and the apes, and he appeared to have maintained a distance between humanity and the rest of the animal realm. He considered the capacity for human reason and complex language to be a spiritual endowment from God, and this could not be acquired naturally. He was also open to acceptance of some evolutionary change among certain living organisms over extended periods of time. But such differences he thought were possibly due to degeneration from the original perfect forms: for instance,

he considered that the donkey may have been a degeneration of the horse.³⁰ However, Darwin found Buffon difficult to understand and thought his views often “fluctuated greatly” during his lifetime.³¹ Buffon was of course concerned to protect his reputation and position at the Jardin du Roi in Paris, and was perhaps guarded in expressing his actual beliefs in relation to evolution. Other writers in France in the early and mid-18th century, such as de Maillet and Diderot, were expounding the possibility of some forms of evolution.³²

In the late 18th century Lord Monboddo was more determined to identify an evolutionary link between humans and apes. He practised as a judge in Scotland, and was otherwise known as James Burnett (1714–1799) (figure 9). Monboddo was influenced by the Greek philosophers, and he argued that the Aristotelian great chain of being should extend from apes to man via a gradual process of evolution. He continued to accept the accounts of travellers regarding the orang-outang, and with credulity the existence of the strange Plinian beings from the ancient world. He was mocked for suggesting men once had tails. His arguments were put forward in two volumes: *Of the origin and progress of language* (1773–1792), and *Antient Metaphysics* (1779–1799). Therefore, he rejected the evidence-based opinion of Tyson and Buffon that apes and human beings were clearly different and separately created entities. Monboddo maintained, without evidence, that apes and monkeys possessed a rudimentary language, thus reinforcing the link to mankind and worked doggedly in support of his position.⁶

He also speculated that early man had lived peaceably close to nature and had a primitive language. To support his view, he proposed a number of experiments and studied several accounts of feral children. Monboddo’s acquaintance, Jean-Jacques Rousseau, had earlier argued for the social evolution of mankind from a state of nature, with early man living in blissful ignorance like the apes. However, Rousseau was less willing to argue for the biological evolution of mankind, believing that early man had the present physical form even though only possessing animal-like mental capacities.³³

Monboddo also rejected anatomical studies by Peter Camper that found no evidence of speech organs on the orang-outang—this on the basis that Camper’s animals came from Borneo and not from the place of Tyson’s specimen (probably Angola).³⁴ Camper’s conclusions were significant in view of the fact that he had dissected a good number of animals in his work. Camper commented:

“Having dissected the whole organ of voice in the Orang, in apes, and several monkeys, I have a right to conclude, that Orangs and apes are not made to modulate the voice like men: for the air passing by the *rima glottidis* is immediately lost in the ventricles or ventricle of the neck, as in apes and monkeys, and

must consequently return from thence without any force and melody within the throat and mouth of these creatures: and this seems to me the most evident proof of the incapacity of Orangs, apes, and monkeys, to utter any modulated voice, as indeed they never have been observed to do.”

Camper was also critical of earlier anatomical studies by Tyson, concluding he had overlooked the significance of the detail of the voice organs.

Summary

It is evident that beliefs stemming from antiquity regarding the existence of mythical creatures continued into the early modern period, despite clear statements of caution from Augustine. Popular superstition and mythology filtered into the minds of many academics when faced with new, but limited numbers of primate specimens from Africa and Asia. These were depicted through sometimes poor drawings, which reinforced error through several centuries. Tyson’s analysis from the late 17th century showed that there was a clear distinction between apes and human beings, and he argued persuasively that many of the claims from ancient times were most probably sightings of apes and monkeys. Such rational thinking should have clarified matters for science, although Tyson’s work left an opportunity for confusion, and was later criticised by Camper.

Further confusion arose through Linnaeus’ classification scheme which placed human beings within the Primate order, alongside apes and monkeys which were classified within the subgenus *Homo nocturnus*. This classification was reinforced by the embellished drawings of Hoppius, arguably one of the first imaginative ape-to-man *march-of-progress* drawings. Although Linnaeus believed in special creation, it was a few years later that Lord Monboddo argued for an evolutionary connection between the apes and human beings.

It is noteworthy that speculation from travellers and popular mythology from antiquity was still informing scientific discourse into the 18th century, and this arguably laid some of the ground work for later acceptance of Darwinian evolution. But the best evidence-based scientific studies from Buffon and Camper showed a clear demarcation between human beings and the other animals. Buffon recognised the important distinctions of intelligence and language, and commented that apes showed no more intelligence than a well-trained dog, although Buffon was sometimes ambiguous in his beliefs. Camper clarified from anatomical studies that apes and monkeys are incapable of speech.

When Darwin and Huxley resurrected the evolutionary link in the 19th century, it was on the basis of comparative brain physiology. Belief in evolution also fed upon an undercurrent of popular mythology that there existed missing

links between apes and men, but the search for the missing links soon passed from the present to the fossil record.

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The effects of the Curse visible in the cosmos present another biblical creationist starlight travel-time problem

John G. Hartnett

The notion that the Curse was applied to the whole universe creates another light travel-time problem for biblical creation. Even if we assume that God supernaturally instantly cursed all parts of the universe how do we see those effects *now*? Any biblical creation cosmology that assumes the ASC is the language of the Bible, which includes an infinite one-way speed of light to the observer on Earth, has an answer to this question. Yet, any cosmology that assumes the ESC is the language of the Bible, which includes the speed of light limited to c (approximately 300,000 km/s), appears to not be able to answer the question. *This alone would appear to rule out all cosmologies that rely on the ESC as the language of the Bible.*

The Curse is an event that many Bible-reading Christians know something about. We read in Genesis 3:14–17 that God cursed the earth after Adam and Eve sinned against Him by eating of the tree which He commanded them not to eat of. Their sin brought on them the serious consequence of death. God also cursed the creation, bringing about various forms of corruption, which resulted in life being much more difficult for Adam and Eve and the rest of all life on Earth. The Scriptures tell us that God cursed the whole creation—the whole universe. We may conclude this from Romans 5:12:

“Therefore, just as *sin came into the world* [Greek *kosmos*] through one man, and death through sin, and so death spread to all men because all sinned [emphasis added]”.

The Greek word *kosmos* meaning ‘orderly arrangement’ is translated ‘the world’ in this verse, but meaning the whole universe. (Incidentally, it is the word from which we derive our English word ‘cosmos’.) Thus it was not only humans that were cursed but the whole universe. This is standard biblical creationist doctrine. This conclusion is strengthened when we read Romans 8:19–23:

“For *the creation* [Greek *ktisis*] waits with eager longing for the revealing of the sons of God.²⁰ For *the creation was subjected to futility*, not willingly, but because of him who subjected it, in hope²¹ that *the creation* itself will be set free from its bondage to corruption and obtain the freedom of the glory of the children of God.²² For we know that *the whole creation* has been groaning together in the pains of childbirth until now.²³ And not only *the creation*, but *we ourselves*, who have the firstfruits of the Spirit, groan inwardly as we wait eagerly for adoption as sons, the redemption of our bodies [emphases added].”

In this passage the Greek word *ktisis*, meaning ‘original formation’, is translated as ‘the creation’. From the context it has the meaning of the entire creation—animate and inanimate—with the exception of two sets of beings.

From verse 23 we can conclude that ‘the creation’ as used in the context in this passage in Romans 8 does not include the saved children of God. They are treated by the author as a separate category. Of course, they are subject to/feel the effects of the Curse; they ‘groan inwardly’. This just highlights the fact that ‘whole creation’ may not mean everything. Also it would not include the unbelieving humans as they are not eagerly waiting for the adoption as sons of God. And it cannot include the angels, because the good angels are not subject to futility and therefore the Curse. The bad angels ‘fell’ sometime before the Curse itself and many are kept in chains in prison (2 Peter 2:4) until the final judgement. Thus it would seem that the angels are not affected by the Curse. Besides, they are not part of the material universe. So the meaning ‘the creation’ here is all other living creatures (non-human) and all the physical universe.¹

We are familiar with the effects of the Curse in our environment. Corruption and decay is all around in nature and in the inanimate physical world. It has been argued by creationists that the Law of Decay (the Second Law of Thermodynamics) is not itself the result of the Curse because it is a law that living organisms, prior to the Curse, would have relied upon.

One way of explaining God’s action at the Curse is that He withdrew some of His sustaining power, which, prior to the Curse, would have been sufficient to reverse any net corruption in the bodies of Adam and Eve as well as in the physical world. A good example is Moses observing the burning bush (Exodus 3:2–3). The Second Law of

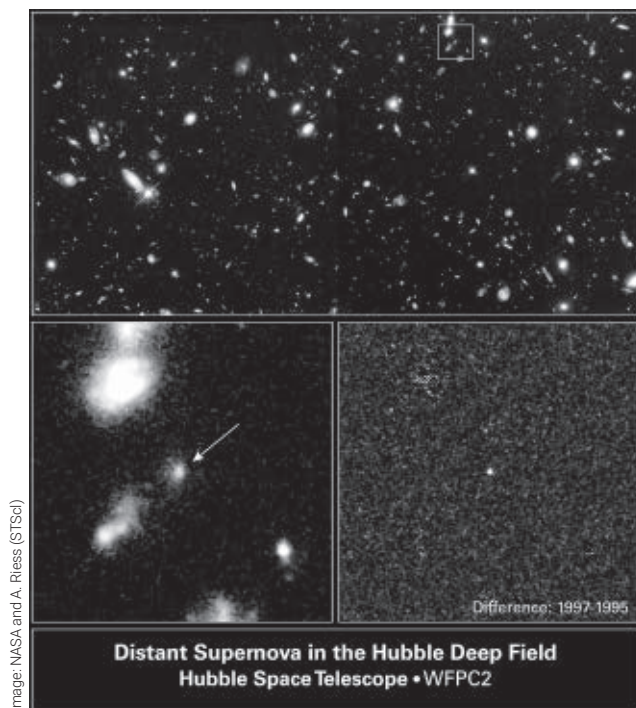


Figure 1. Distant supernova in Hubble Deep Field-North (HDF-N, SN1997ff). The supernova SN1997ff is alleged to be located in a galaxy at a distance of 10 billion light years. It was first seen in 1997. Under the assumption of the ASC it occurred in 1997 but under the assumption of the ESC it occurred 10 billion years ago. If the effect of the Curse was that God removed some of His sustaining power, allowing stars to age and some explode, how do we see the effects only about 6,000 years after the creation?

Thermodynamics describes the physics of oxidation (a decay process) that gives rise to heat and light, but the bush did not burn away as expected. God reversed the decay process with some supernatural power to sustain the bush. Thus at the Curse when He withdrew some of that sustaining power, corruption and decay set in. Prior to that action there was no net decay. As a result there was no death of living creatures (*nephesh chayyāh*).

If the meanings of *kosmos* and *ktisis* in these verses are as suggested then God cursed the whole universe in such a way that we on Earth are able to see those effects in the cosmos. For this discussion it does not matter precisely which are those effects, but only that the language of ‘the creation’ being subject to ‘futility’ means that it all was affected and as earth observers we can see that.

Now here is where the problem comes in.

A light travel-time problem

God is not limited by anything so He could simply have instantly cursed the whole universe. But how are we able to see those effects in the distant universe, millions and billions

of light years away? This would seem to be another starlight travel-time problem.

We don’t know how long after the creation it was when Adam and Eve sinned and God cursed the universe. It most probably was a very short period but could have been several years.² It does not matter. But we do know that the Curse occurred after the conclusion of Creation Week. That is important!

If the language of the Bible uses the Einstein Synchrony Convention (ESC) then all events are clocked by when³ any Earth observer would calculate that the light left the source in the cosmos. Under the ESC the speed of light is isotropic and travels at 1 light year per year or approximately 300,000 km/s and is usually denoted by the letter *c*. If God cursed the cosmos, and instantly and supernaturally did so, and if you believe that earthlings can see the effects of the Curse,⁴ then you have another light travel-time problem in the universe, billions of light years in extent. At the speed of light (*c*) it should take millions and billions of years for the light to reach Earth.

This is the exact same problem for the creation of the stars on Day 4 of Creation Week but now we cannot point to the fact that it occurred in Creation Week. If you argue that we can see the effects of the Curse in the universe as a result of some sort of time dilation effect in a proposed creationist cosmology then you also have to explain how that cosmology could apply after God has finished His creative acts. You no longer have the benefit of some extraordinary supernatural effects during Creation Week because God was creating at that time.

One way out of the problem would be to argue that those Greek words translated, respectively, as ‘the world’ in Romans 5:12 and ‘the creation’ in Romans 8:19–23 do not include in their meaning the whole universe. It might only be referring to the world that man is influenced by. Romans 8:20 states that the ‘creation was subject to futility’. As explained above ‘the creation’ here does not include mankind nor angels but all other lifeforms created by God. God cursed His own physical creation. He also cursed mankind in different ways, but the context of Romans 8 indicates that the creation itself will be released from the bondage of the Curse and will be set free like the saved children of God. So perhaps it is only a reference to the creatures and not the physical world. But from the context that does not seem to be the most satisfactory solution.

If the Curse was only on the solar system there would be no problem. The effects of the Curse could easily be seen within the solar system as light travelling at speed *c* has no difficulty to reach Earth in less than 24 hours.

Another solution, which I am inclined to believe, is that the effects of the Curse outside our solar system are not so apparent. That is, we should never consider a supernova

itself, for example, to be directly a result of the Curse.⁵ Rather, *when* God withdrew some of His sustaining power from the universe,⁶ the Second Law took full control and we see the effects of decay all around. Perhaps when God cursed the cosmos He withdrew some of His sustaining, restorative power bringing on the full consequence of the Law of Decay. The Second Law then is the agency by which stars age and ultimately that leads to stars going supernova (exploding), yet all a result of the current laws of physics. However, that is a topic beyond the present scope of this discussion and is not central to it.

Let's proceed with the most widely held interpretation of these verses. Let's assume the meanings of the Greek words *kosmos* and *ktisis* include all of the visible universe.

The Anisotropic Synchrony Convention provides a solution

As stated above, this presents a starlight travel-time problem for any cosmology where the ESC is assumed to the language of the Bible. But for any cosmology that assumes the language of the Bible is the Anisotropic Synchrony Convention (ASC) there is no light travel-time problem.

The Curse occurs on Earth sometime after Creation Week. Assuming the whole cosmos is cursed there are two possibilities as to how the Curse was applied to the whole universe. If a 'wave of corruption' was applied it would need to travel outwards at the speed c under any ESC model or $\frac{1}{2}c$ under any ASC model. That means it would take billions of years for those effects to take effect in the cosmos. But the second possibility is that God instantly and supernaturally simultaneously⁷ cursed the whole universe. There was no 'wave of corruption' travelling out from the earth.

For any ESC model the wave of corruption idea is doubly difficult because it doubles the time we would need before we Earth observers could see the effects of the Curse in the distant cosmos. So let's assume that for any model we consider, there was no such speed-limited wave but the cursing of the creation was instantaneous. Furthermore, let us assume that we *do see* effects of the Curse in the universe 'now'.

This alone would appear to rule out all cosmologies that rely on the ESC as the language of the Bible. The light from those 'cursed' sources in the distant cosmos would take billions of years to travel to Earth. So how can we see them 'now'?

Yet, under any cosmology that relies on the ASC as the language of the Bible light from distant galaxies travels to Earth instantly. Events are timestamped at the moment an Earth observer sees them happen. So if God supernaturally instantly cursed all the universe, any effects of that Curse would be instantly seen by Earth observers.

However, you then might argue that the ASC only uses phenomenological language and 'really' it means that it 'really' takes light, travelling at speed c , billions of years to get here. That objection assumes that the speed of light is isotropic and finite—that that is some absolute truth about the universe. However, it is an unprovable assumption. You are just assuming it to be true and hence just begging the question. The one-way (incoming) speed of light might actually be infinite and you could never prove otherwise. You definitely cannot disprove such a claim. This issue then enters the realm of circularity in the argument to disprove the conventionality thesis of the simultaneity of distant events.^{8,9}

But again, let's give the claim the benefit of the doubt. Even though we cannot make this assumption based on any empirical measurement, let us assume that the speed light 'really' *travels in* from the cosmos is c and hence finite. In such a case God could have created an acausal (space-like) hypersurface at the appropriate time after creation that reflects all events that would be seen in a cursed universe. This hypersurface could have been created exactly the same number of seconds after the initial creation hypersurface of all stars and galaxies as the number of seconds from the Day 4 creation to the Curse.¹⁰

Since God is omniscient and has knowledge of all events in space and time it would be no difficulty for Him to have done so. He sees the future from the beginning.

Isaiah 46:10:

"Declaring the end from the beginning, and from ancient times the things that are not yet done, saying, My counsel shall stand, and I will do all My pleasure [emphasis added]". (KJVER)

Light from all these Curse events would have arrived at the earth at the exact same moment under the assumption of the ASC. That means under the ASC (language of appearance) we (Earth observers in a unique position in the universe) always see everything in the universal 'now'—that is, at the same instant the event occurs, without any billions of years of light travel time.¹¹

In the ASC model, but viewed under the assumption of the ESC, the light from all Curse events arrives at the earth at the same moment but the stars would not have been created at the same moment.¹²

The ASC model requires the stars to have been created in such a way that the first light from all stars arrived on Day 4. The closer stars had to be created later and more distant stars earlier so that all light travelling at speed c arrives at the earth within the 24 hours of Day 4. A star a billion light years away had to have been created a billion years before a star one light year away.

Under the ASC the Curse event occurs throughout the whole universe the instant God gave the word.

This is reflected in Isaiah 48:13:

"My hand also has laid the foundation of the earth,

and My right hand has spanned the heavens: *when I call to them, they stand up together* [emphasis added].” (KJVER)

This verse indicates instantaneous creation. Regardless of how far apart the stars are they were created together at once, meaning at the same time (measured on Earth), but not at the same place. This is easily understood as instantaneous under the ASC model. That is, viewed from Earth the stars were created simultaneously or at least all on Day 4.

In the same way God inflicted the Curse upon the heavens. He spoke the word and the effects were instantaneous and simultaneous. No delay at all. No millions or billions of years of waiting. From this perspective there is no alternative but to believe that the language of the Bible employs the Anisotropic Synchrony Convention.

Conclusion

If you believe that the Scriptures describe the Curse as a universal event and that the effects of that were, and are currently, observed in the whole universe then this introduces another light travel-time problem for biblical creation.

Even if God instantly and supernaturally simultaneously cursed the whole universe how are we able to see such effects in the distant cosmos, millions and billions of light years away?

The Curse occurred after the conclusion of Creation Week. Though the Curse itself required some supernatural intervention in the creation there is no suggestion that anything like the creation of stars occurred after Creation Week. That means there were no supernatural creative processes on the scale of the whole universe that one might argue produced some sort of relativistic time dilation effects.

Rather, I suggest the *main effect of the Curse on the cosmos* was the removal of some of God’s sustaining power, which allowed full reign to the Second Law of Thermodynamics, the Law of Decay. Hence stars began to burn up their fuel. We see effects of that type everywhere in the cosmos.

So if the light from cosmic sources affected by the Curse travels in to Earth at the speed of light, c , then wouldn’t the light from those events still be travelling in towards Earth? Any cosmology that assumes the ASC is the language of the Bible can answer this question within the biblical timeframe of about 6,000 years. But it would seem that any cosmology that assumes the ESC is the language of the Bible, and is hence limited to the finite speed of light, has another light travel-time problem. *This fact alone would appear to rule out all cosmologies that rely on the ESC as the language of the Bible.*

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3. Using local Earth clocks. All biblical creationist cosmologies must record the creation of all stars on Day 4 of Creation Week, a 24-hour day. It is essential that this is measured by local Earth clocks, but it is not necessary that it be so if measured by hypothetical cosmic clocks.
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The Continuous Environmental Tracking hypothesis—application in seed dormancy and germination in forest ecosystems

Tom Hennigan and Randy Guliuzza

God created creatures to multiply and fill the earth and imbued them with design features that enable them to diversify, persist, and occupy new habitats. Focused research using engineering principles with emphasis on biological design of organisms and their responses to natural conditions can be a productive way to better understand how God designed them to do this. The Continuous Environmental Tracking (CET) hypothesis incorporates human engineering analogues and assumes that organisms have been designed with intelligently engineered systems that include sensors, logic mechanisms, and output responses. Data suggest that forest seeds are constantly monitoring and responding to changing environmental conditions. Identified seed sensors can detect conditions such as light, smoke, and temperature. These sensors are connected to biochemical pathways that are logic mechanisms affecting output responses that inform the seed to remain dormant or germinate. These observations, similar to human engineered tracking systems, are consistent with CET predictions. The CET hypothesis provides a research protocol for building a creation model of biology. It guides researchers to focus on how organisms detect environmental conditions, trace biochemical and genetic pathways, and discover how these logic mechanisms help the organism address its ever-changing environment, in order to adapt, diversify, multiply, restore beauty, and persist.

For over 100 years, philosophical and material naturalists have hypothesized that current organism diversity and adaptation can be explained without invoking the supernatural. A key assumption of this traditional modernist interpretation is that organism adaptation and diversification are driven by arbitrary natural processes that are random, unguided, and unregulated.¹ If genetic changes provide a natural advantage to the organism, get passed on to future generations, and begin to change the genetic dynamics of populations (e.g. natural selection, gene flow, drift), then adaptation and diversification are taking place.² However, what many evolutionary biologists are recognizing is that these mechanisms are too simplistic and cannot explain biological observations for a host of adaptive mechanisms that include ecological, behavioural, genetic, and epigenetic responses.

The complexities surrounding organism relationships with one another and their environment continue to reveal labyrinthine processes we are just beginning to appreciate. For example, Duncan *et al.*³ discuss the importance of epigenetic research which continues to show how organisms self-modify their chromatin and expressions of their DNA—without changes to nucleotide sequences—in response to detecting specific environmental conditions. More organisms continue to be identified as phenotypically plastic where one genome is capable of producing different phenotypes as specified responses targeted to the environmental circumstances it detects. Polyphenisms are a type of

phenotypic plasticity where a single population may have multiple phenotypes in response to environmental cues such as temperature, nutrients, population densities, predators, and insolation.⁴ For example, in response to nutrient availability and other environmental conditions, plants such as geraniums (*Geranium transversale*) and jack-in-the-pulpits (*Arisaema triphyllum*) may change gender in a process known as gender diphasy.^{5–7}

Gilbert discusses the importance of environmental conditions in biology where developmental programming is context-dependent such as reptiles, like snapping turtles (*Chelydra serpentina*), that exhibit temperature-dependent sex determination.⁴ The traditional naturalistic interpretation is that gender is determined by soil temperature during the second trimester. But what if these observations could be reinterpreted as snapping turtles having an identifiable temperature sensor and the path of the developmental program is *internally selected* as a specific and necessary consequence of innate ‘if-then’ logical programming based on data about the temperature the embryo detects? In other words, is nature selecting or is the organism responding to natural conditions based on highly complex internal programming?

In order for organisms to relationally respond to one another and respond to their environment, they must have ways of detecting, identifying, and communicating with each other and the changing environmental conditions around

them. They must be able to transmit that information through messaging pathways that inform specific locations of the genetic control centre, which in turn change behavioural or phenotypic responses, appropriate to the conditions and organisms they encounter. Because the traditional view does not adequately explain this biological complexity, there is discontent in the scientific ranks because they recognize a need to update naturalistic hypothetical mechanisms that can better explain these phenomena.^{2,8,9}

Organism dynamics that are making it more difficult for traditional evolutionary mechanisms to explain include:

- Adaptations overwhelmingly appear targeted
- Organisms have programmed modification capability to produce new and functional phenotypes
- Organisms can track changing environmental conditions and adjust
- Diverse organisms repeatedly express similar morphological traits in similar environments
- Mechanisms appear highly regulated
- Adaptive genetic modifications appear internally controlled and non-random
- The genome is being viewed by many as a read and write library capable of revision
- Adaptation rates, and hence speciation, may be variable and can be rapid
- Some adaptations can be repeatable and predictable
- Some adaptations are reversible
- Adaptive mechanisms include genetic, epigenetic, developmental, founder effect, and ecological
- Observed transgenerational inheritance mechanisms include epigenetic, physiological, behavioural, and ecological¹⁰

These observations were summarized in a 2016 Royal Society meeting in London in November 2016,¹¹ and Guliuzza and Gaskill reinterpreted mechanisms for the above phenomena by proposing that biological functions are best explained by engineering principles as a step toward developing a theory of biological design.¹⁰

For biblical creation researchers, the Torah contains foundational information in the form of an outline of sequential and creative activities by the Author and Creator of these first week organisms and processes.¹² It is evident that God desires to be known and He has imparted His invisible qualities into the visible creation to remind us of our need to worship Him as Creator.¹³ With those who have eyes to see, His attributes of beauty, relationship, and engineering prowess continue to inspire Christian researchers to learn about His world with the goal of building scientific models that give Christ glory and honour. With every discovery, we gain more insight into Him, His infinite wisdom, and His love. Consider, for example, complex biogeochemical cycles that are required for life. They powerfully illustrate God's love and provision, but also suggest incredibly elaborate and

irreducibly complex systems design and relationships.^{14,15} Conversely, it is also evident that there is something wrong with creation, as pain, suffering, and death are a characteristic of our world. These 'birth pains' are consistent with God's curse and judgment on the planet because of man's rebellion.^{16–18}

It is within this creation framework that we reject purely naturalistic explanations both for the origin of life and the ability of organisms to adapt and diversify. We understand that the interpretations of adaptational processes have naturalistic bias attached to them, so we use this term with the idea that organisms are responding to natural conditions because they have been engineered to do so. If an organism goes extinct, it is either because they were not designed for particular environmental conditions or there were extreme events that caused their demise (e.g. The Flood, anthropogenic factors such as extermination or habitat loss).

The Continuous Environmental Tracking (CET) hypothesis was proposed as an engineering and relational approach, based on God's attributes that could contribute key scaffolding for a creation model of biological and ecological processes that include: adaptation, symbioses, biogeochemical cycles, extirpation, extinction, epigenetics, phenotypic plasticity, and rapid baraminological diversification.¹¹ We emphasize that organisms are not being viewed as machines but as living entities designed with varying abilities to enter into relationships with one another and respond to changing environments in order to fit-and-fill and/or replace and persist in ecological communities. That creatures can adapt to a kaleidoscope of seemingly insurmountable environmental challenges provides an ongoing display of the phenomenal engineering that went into their design.

Based on our current understanding of organism relationships and functions, the CET hypothesis proposes that natural processes are not key drivers of organism change but rather organisms have been designed to actively monitor changing natural conditions and respond to them by self-adjusting, using programmed engineering tools, similar to how human engineers might design robotic or drone systems. Therefore, we hypothesize that all organisms have been designed with the following functions observed in human tracking systems:

1. *Sensors* which are designed to monitor specific environmental conditions, while minimally affecting the environmental variable being studied. Sensors must be ready to collect data by active surveillance and must be connected to the total organism system.
2. *Logic mechanisms* include 'if-then' types of on-off switches and gates connected to the sensors and genetic mechanisms that control organism responses.
3. *Output responses* where God has programmed organisms to change and respond appropriately to the new

environmental condition in order to continually fill new environmental niches and persist in them.

Expected predictions and the CET hypothesis: criteria for acceptance/rejection

This hypothesis is based on systems designed by human engineers. When studying well-designed machines like robotic drones, they have detectors, logic-centred algorithms, and the ability to locate, track, and follow a target. As far as we know, all organisms are able to monitor, track, and respond to their environment. Consider the bacterial and fungal networks that coordinate plant and animal communication and survival,¹⁹ plants mounting chemical defences as they respond to leaf vibrations caused by herbivorous insects,²⁰ mycorrhizal fungi competing with soil bacteria to affect soil carbon storage,²¹ underground fungal networks warning plants of aphid attacks,²² increasing CO₂ concentrations and the associated intrinsic water use efficiency in some plants,²³ above-ground environmental stress detected as a stimulus for below-ground communication and response to that stress,²⁴ and orchid seed germination, survival, and persistence requiring obligate symbioses with fungi.²⁵ These phenotypic and genetic changes are often rapid, predictable, heritable, and can stabilize in populations, but not necessarily in particular individuals. When studying these phenomena, we can predict where to search for possible sensors and narrow down their locations. Once found we can trace biochemical pathways and networks as the probable logic mechanisms

that will somehow affect the genetics/epigenetics and or biochemistry that modulates the organism so that it can respond accordingly. If no such mechanisms are located, then the CET hypothesis can be falsified. Based on the above criteria, we will both apply and test the CET hypothesis for seed dormancy and germination specifically, how a seed ‘knows’ when to germinate especially when lying dormant in forest soil for 60 years or more.²⁶

An overview of forest ecosystems

It is estimated that forests make up 30% of the earth’s terrestrial biomes which consist of 3.9 billion ha (9.6 billion acres) and about 3 trillion trees, depending on measurement parameters of vegetation.^{27,28} Some evidence suggests that vegetation is increasing as the planet continues to ‘green’.²⁹ Forest ecosystems consist of complex organism and environmental relationships comprised of currently incomprehensible systems where communication and interactions between organisms and with the abiotic environment are prevalent from the forest soil to the forest canopy. These relationships and processes combine to produce forest ecosystems capable of crucial ecological and biospheric services that include: oxygen production, organism habitat, soil productivity, erosion control, flood regulation, shade and microclimate control, water purification, stream ecosystem health, global climate regulation, community succession, and aesthetics appreciation and recreation for humans.³⁰

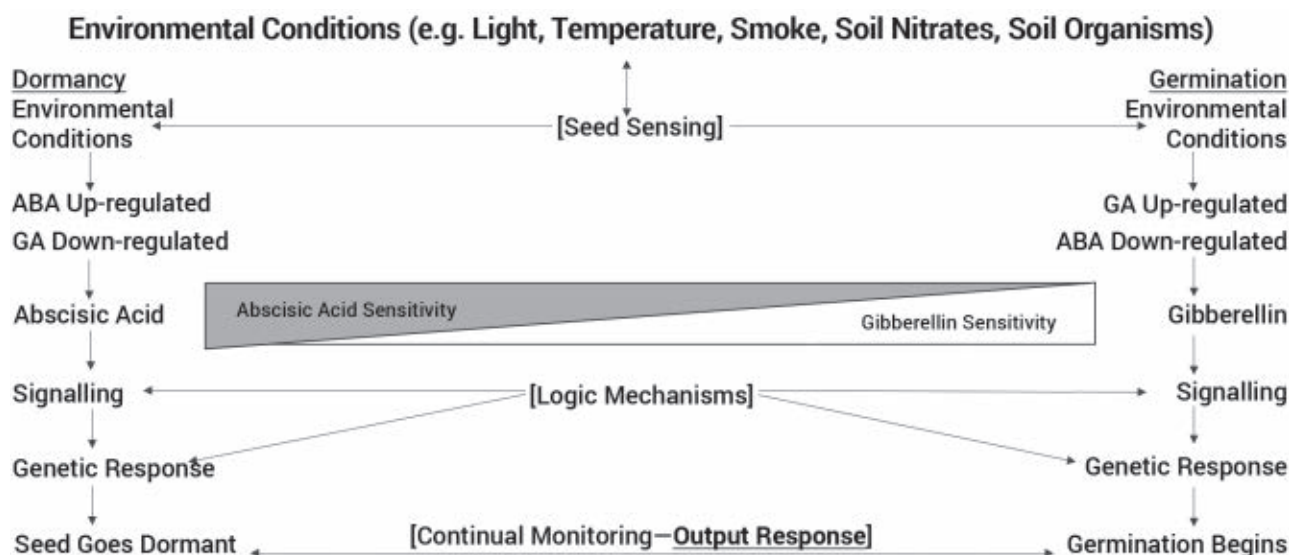


Figure 1. Continuous Environmental Tracking (CET) application to ABA:GA model of dormancy regulation (after Taiz *et al.*,³⁴ p. 518). The Hormone Balance theory simplistically models the concentrations of two antagonistic phytohormones: abscisic acid (ABA) and gibberellin (GA). ABA up-regulation and GA down-regulation promote seed dormancy and when environmental conditions are right, GA up-regulation and ABA down-regulation promote germination.^{34,41} Research suggests that there is much more going on than just the concentrations of ABA:GA. However, complexity with seed dormancy/germination phenomena is consistent with the CET hypothesis since seeds continually monitor their environment, and require sophisticated engineering mechanisms that include sensors, logic mechanisms, and output responses.

Forest systems are constantly challenged by natural disturbance. Perturbations include; forest fire, flood, earthquake, volcanic eruption, heavy snow, intense freeze/thaw, and various pathogens. God has designed these systems to express a cycle (or phases) of adaptive responses, but how they recover is dependent on organism composition, structural and/or spatial patterns of system elements, and systems level characteristics that include biogeochemical cycling, microclimate, species diversity, topography, genetics/epigenetics, and forest productivity.³¹ For example, fire-adaptable trees like Table Mountain pine (*Pinus pungens*) and lodgepole pine (*Pinus contorta*) have heat-sensing (serotinous) cones that hold viable seeds. When a fire disrupts these forests, heat from the fire is detected by the cones, causing them to open and disperse the new seeds that will germinate, replace, and establish the previous forest. One of the system components that determine how forest environments bounce back from challenges are the legacies left behind.³² Legacies are the survivors of extreme disturbance and include: serotinous cone-bearing trees and the ability of seeds to lie dormant and viable, sometimes for thousands of years and germinating when conditions permit.^{33,34}

The complexity of seed dormancy

When seeds drop from the mother plant on to the forest soil, they accumulate and form a soil seed bank. This phenomenon could be interpreted as God's design for forests to make long-term deposits for future forest emergencies.³⁵ Seeds must be able to monitor environmental conditions and be programmed in a way to germinate when conditions are conducive for healthy seed establishment. The steps toward germination include: Phase 1, water imbibition via seed coat under proper conditions (e.g. humidity, light, soil temperature, nitrate concentrations, smoke, oxygen); Phase 2, end of water uptake; and Phase 3 embryonic root growth (protuberance).³⁶ However, as simple as the above may sound, all details of seed endurance, dormancy, and germination continue to evade researchers. There are times of the year when some environmental variables are conducive to germination, but the seed does not germinate. In this instance the seed is said to be dormant. Dormancy is important because it provides the needed time for seeds to disperse to appropriate microclimates, gives them a better germination rate in the appropriate growing season or spatial conditions, and prevents germination during deleterious environmental conditions.³⁷ General seed states are differentiated into primary dormancy, secondary dormancy, and vivipary. Vivipary describes seeds that are germinating on the mother plant before dispersal. Primary dormancy refers to seeds that remain dormant under normal environmental conditions while secondary dormancy refers to non-dormant seeds that do not germinate when they detect unfavourable environmental

conditions.³⁴ As research progresses in this area, it is clear that seed condition categories do not properly describe the complexity surrounding dormancy and germination.

Baskin and Baskin³⁸ recognize that seed dormancy mechanisms are many and varied depending on plant species, and whose responses are tailored to environmental conditions and other organisms present. Consequently, they have proposed a dormancy classification system. *Physiological dormancy*, further subdivided into non-deep, intermediate, and deep, is controlled by physiological processes within the seed. *Morphological dormancy* occurs when the embryo is too small, therefore the seed will not germinate until the embryo reaches full size. *Morphophysiological dormancy* is seeds having both an underdeveloped embryo and a physiological variable controlling germination. *Physical dormancy* is controlled by *traits of the seed coat* such as its water impermeability and reaction to natural processes such as heat, chemical scarification, or physical scarification that physically break down the seed coat and promote germination. In *Combinational dormancy* the embryo is dormant because the seed coat is both water impermeable and has a physiological mechanism controlling germination.

Dormancy mechanisms

A great deal of research is being done on seed dormancy and germination mechanisms using the model plant known as thale cress (*Arabidopsis thaliana*).^{39,40} Though many questions remain about dormancy mechanisms, much has been learned. According to the Hormone Balance Theory (figure 1), the concentrations of two antagonistic phytohormones have significant, but not the only roles involved in germination and dormancy. These plant hormones are abscisic acid (ABA) and gibberellin (GA). They are antagonistic because they negatively influence each other and their signalling pathways.³⁹ ABA biosynthesis (up-regulation) and GA catabolism (down-regulation) promote seed dormancy and when the time and conditions are right, GA up-regulation and ABA down-regulation promote germination.^{35,41} Two factors are important in determining whether the seed remains dormant or begins to germinate: the concentration of the phytohormones and the ability of seed tissues to detect them. Other hormones are also involved and it has been shown that ethylene and brassinosteroids can inhibit ABA and promote germination or ABA can inhibit ethylene biosynthesis favouring dormancy or auxins can promote dormancy in conjunction with ABA, while brassinosteroids can increase the rate of ethylene biosynthesis, favouring germination.^{34,41} The biochemical cascades and signalling pathways are highly complex but the complexity is magnified because the above processes and responses the plant makes depend on environmental conditions, seed morphology, and seed physiology.⁴²

CET hypothesis applied and tested for forest seed dormancy and germination: the sensors

Regardless of the above mechanisms, seeds must monitor environmental conditions to ‘know’ when to remain dormant and when to germinate. Experimental research suggests that seeds in the soil are constantly adjusting phytohormone ratios, which inform dormancy/germination responses based on changing environmental conditions.^{34,39} There is also evidence that some plants monitor changing environmental conditions (e.g. low temperatures) before flowering, fruit, and seed production and later enhance the dormancy of seeds. In other words, the mother plant can pass down information about the environmental conditions it is experiencing and prepare the seeds for those conditions before the seeds are produced. These data, and other lines of evidence, indicate that at least some plants are capable of memory storage, used in a mother-to-offspring anticipatory system whose inherited information in the next generation prepares them to be optimally suited for the conditions the designed program anticipates they will encounter.^{40,43,44} Just how plants are monitoring the environment is a question being actively researched. Presently there are at least three seed sensors that have been identified in detecting light, temperature, and smoke.

Phytochromes: primary sensor for light

Plants require varying light characteristics for germination and these are often species-dependent. For example, birch trees (*Betula sp.*) require long days while Eastern hemlocks (*Tsuga canadensis*) require short days.⁴⁵ Phytochromes (among others) have been well described as the primary photoreceptors (sensors) capable of absorbing photons of a given wavelength, producing energy used to signal a cascade of reactions that trigger genes, which causes a plant to respond (see figure 1). Phytochromes primarily absorb the red to far red (600–750 nm) most efficiently, but can also absorb blue (350–500 nm), and UV-A (320–400 nm).⁴⁵ Phytochrome structures vary depending on their function but all consist of a protein attached to a chromophore (non-protein molecule).⁴⁵ Depending on the protein structure and function, phytochromes are sensitive to various properties of light. Some are sensitive to the quantity of light, others are sensitive to the quality of light (e.g. wavelength dependency and associated action spectra), and others are designed for light intensity parameters, while others operate based on light duration.⁴⁵ We

also know that multiple photoreceptors can be found on one plant and they interact with each other in complex ways. These programmed abilities in forest seeds ensure that at least some seeds will germinate and establish to fill new niches, persist over time, and/or replace a forest that has been destroyed.

Delay of germination-1 gene: temperature sensor

Genes have been identified in some plants that are key regulators of dormancy and germination.³⁹ These genes are identified as *Delay of Germination 1* (*DOG 1*) and *Reduced Dormancy 5* (*RDO5*). More will be discussed about these logic mechanisms below, but data suggest that *DOG-1* may also have a role as an important seed temperature sensor.³⁹ Some seeds require a period of time at low temperatures (e.g. 0°–10°C), especially important in temperate climes for seed dispersal in autumn where seeds must wait for the best conditions available in spring and summer.³⁹

KARRIKIN-INSENSITIVE-2: smoke sensor

Karrikins are compounds that are classified as butanolides. They are found in the smoke and ash produced by wild fires caused by the burning of cellulose and other sugars that make up vegetation. Precipitation leaches the karrikins from the ash into the seed bank and they have been shown to promote germination in many plant families.⁴⁶ One protein known as KARRIKIN-INSENSITIVE-2 (*KAI2*) has been identified as a smoke sensor, detecting karrikins and starting a germination signalling process that is still being elucidated.^{47,48} Sensors found in seeds that detect light, temperature, and smoke are likely just the beginning when it comes to new sensors

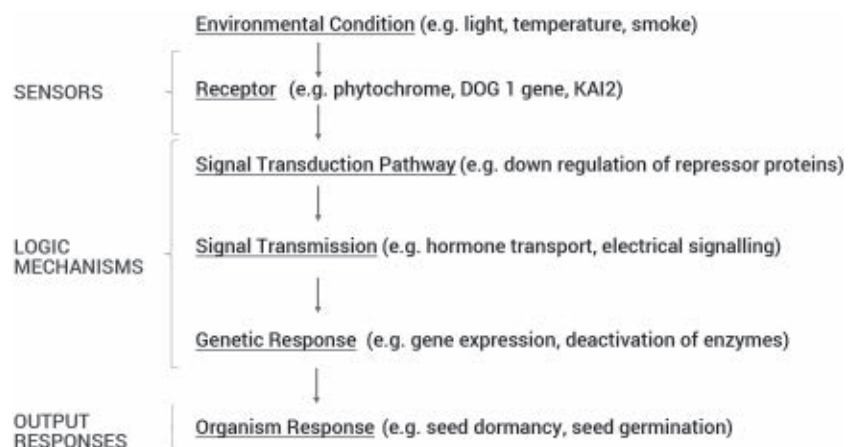


Figure 2. A simplistic model of signal transduction theory in plants, and the model's consistency with the Continuous Environmental Tracking (CET) hypothesis (after Taiz *et al.*,³⁴ p. 409). Dormancy/germination is being regulated by several independent biochemical pathways that require sensors that communicate environmental conditions through signal transductions and transmissions that modify a number of genetic and epigenetic responses, which then inform the organism as to its output response.³⁹

detecting various environmental conditions being discovered and identified.

CET: logic mechanisms and output responses

As for responses seeds must make, all sensors connected to logic mechanisms ultimately determine phytohormone up-regulation and down-regulation, along with other variables, which ultimately trigger output responses of dormancy or germination. Many logic mechanisms have been worked out, but much research is required in order to fully identify cascades and genetic responses and interactions that lead to variable seed responses.

In biology, general models for signal transduction have been developed and are consistent with the CET hypothesis. Figure 2 shows one simplistic version. Nee *et al.*³⁹ summarize some of what is known about dormancy regulators which are types of logic mechanisms. Hormones like ABA, GA, and ethylene, discussed above, are well-known regulators. However, at least three genes have been identified as regulators and they are *DOG-1*, *RDO5*, and *MOTHER of FT (MFT)*. *DOG-1* not only seems to be involved with sensing soil temperature conditions, but also encodes a protein with an unknown function that is correlated with keeping the seed dormant. Similarly, *RDO5* codes for protein phosphatase 2C. Technically this protein is a pseudophosphatase which is a subcategory of the phosphatase family. They are thought to be chemically inactive but may help in biochemical signalling. High protein concentrations from these active genes suggest they are correlated with the output response of seed dormancy, independent of ABA synthesis, though both are required. *MFT* encodes a binding protein called phosphatidyl ethanolamine and acts as a negative feedback with ABA up-regulation, promoting the output response of germination.

Data suggest that epigenetic regulators, in the form of chromatin restructuring, correspond with transcriptional differences involved with seed transitioning through development, dormancy, and germination.³⁹ Chromatin modifiers have been discovered and, depending on how chromatin is changed, will affect transcriptional processes such as acetylation (adding an acetyl group to a compound) and potentially affecting gene expression and metabolism, ubiquitination (adding a small regulatory protein to another protein) which can mark them for destruction, prevent other interactions with proteins, and affect their functioning. Finally, chromatin changes can determine methylation (addition of a methyl group to a substrate) which can alter gene expression, processing of RNAs, and protein function. All of these processes are logic mechanisms that directly control seed output responses toward dormancy or germination (see figure 2).

Some metabolic processes are temperature sensitive and there is evidence that this sensitivity is exploited as part of an

innate logic system as a switching element. For example, Xia *et al.*³⁶ found evidence that in seeds, at certain environmental temperatures, glycolysis and citric acid cycle metabolism decrease with an increase in sucrose metabolism which has been shown to break dormancy. The authors suggest that the regulation of the enzymes involved with the above metabolic processes is occurring at the post-translational level, affecting the output response to germinate.

Conclusions

Over the years, researchers have been formulating models that included identification of seed sensors, logic functions, and programmed responses that fit CET hypothesis predictions (figure 2). They are even using the term sensor, but not equating the term and processes with human-engineered analogues. Legacies left behind after forest disturbance, such as seeds accumulating in forest seed banks, must be able to monitor their environment and respond accordingly. We explain these ecological relationships within a creationist theory of biological design which includes a design-based, organism-focused model of adaptation; CET. We desired to test the CET hypothesis by examining if it could explain seed dormancy and germination. The test questions were: 1) do seeds have the key tracking system elements of sensors, logic mechanisms, and output responses; and 2) do seeds seem to be using these elements to track environmental changes as part of a dispersal-dormancy-germination plan? Our findings indicate seeds are using tracking system elements that correspond to human-designed tracking systems, and that seeds do seem to use these elements in order to continuously track and process data about their external (and internal) conditions producing responses which seem to optimize their potential germination success. These findings are consistent with the CET model expectations.

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Destructive parasites: expressions of God's creation?

Warren A. Shipton

Accounting for the presence of blood-sucking insects that transmit serious diseases is a challenging task. Propositions for the emergence of the malaria organism and filarial worms are suggested in this paper. It is argued that blood-sucking insects originally fed on nectar, honeydew, and perhaps other insects. Changes in gene expression conceivably led to utilization of pain-feeling animals as a ready source of nourishment for egg maturation, a function provided originally by mainly plant sources. Gene expression alterations, changes in insect vectoring of microbes, and their relationship with their hosts occurred after the Fall. It appears that as a result of such changes some benign or beneficial relationships were transformed into ones that caused harm. A study of one filarial worm indicates that it conceivably developed from nematode symbionts of the flies that transmit it. The origin of the malaria organism may represent a modification of some of the blood-associated organisms of frogs enabling an extension of host range. It is conceivable that these organisms operated at creation in a balanced and beneficial manner. Parasitism arose through gene loss, the expression of front-loaded genes now facilitating pathological life cycles, or other scenarios. Further progress can be made in constructing more definitive answers when greater knowledge accumulates.

When some look at the natural world and focus on the blighting diseases seen in plants and animals and the blinding of helpless children by destructive worms (filarial) they scorn at the notion of God. Notice the following from a noted evolutionist by way of illustration.

“When Creationists talk about God creating every individual species as a separate act, they always instance hummingbirds, or orchids, sunflowers and beautiful things. But I tend to think instead of a parasitic worm that is boring through the eye of a boy sitting on the bank of a river in West Africa, [a worm] that’s going to make him blind. And [I ask them], ‘Are you telling me that the God you believe in, who you also say is an all-merciful God, who cares for each one of us individually, are you saying that God created this worm that can live in no other way than in an innocent child’s eyeball? Because that doesn’t seem to me to coincide with a God who’s full of mercy.’”¹

Transformations from a cooperative enterprise

Believers in the biblical account in general understand that God created the basic types of plants, animals, and lower forms of life. Undoubtedly, pre-Flood variants developed. At the time of the Flood, the basic or representative animal types were preserved rather than all species on account of the carrying capacity limitations of the rescue structure (here it must be acknowledged that we have no specific information on the preservation of insects). The enormous variation now seen among insects means that considerable changes have

occurred in subsequent years as a consequence of adaptation and other phenomena.

With this pattern in mind, some suggestions will be given on the emergence of disease-carrying insects and two destructive parasites attacking humans. As readers will appreciate, there are considerable gaps in knowledge, but it is perhaps useful to attempt to construct a scenario that reasonably explains the world about us. I do not presume to provide all the answers.

Ecology of blood-sucking insects

A range of blood-sucking insects is involved in disease transmission. These include mosquitoes, flies, fleas, bugs, vampire moths, ticks, and mites. Two groups of blood-feeding insects, black flies (Simuliidae) and mosquitoes, will be considered. Black flies are transmitters of the river blindness nematode (*Onchocerca volvulus*). Mosquitoes are famous for their ability to carry the malaria parasite (*Plasmodium* spp.), a highly destructive disease. It is estimated that almost half of the world’s population is at risk of the disease, which can cause debilitation and death.²

A number of issues face blood-feeding insects, which will be addressed in brief.

Host finding

The ability of biting insects to find their host depends on multiple factors. Fluctuating levels of carbon dioxide are important clues to the presence of a human host for a mosquito such as *Aedes aegypti*. The insect flies along the

fluctuating concentration plume and on approaching the host is assisted by visual cues and skin odourants. The landing is facilitated by the change in heat and humidity near the target. However, the context in which the stimuli occur will determine their significance.³ Feeding of *Anopheles stephensi* on moth larvae seems to be facilitated by an ability to detect a carbon dioxide gradient and other cues.⁴

Black flies also require a carbon dioxide cue to optimize their chances of contact with a host. Visual cues are of marginal value.⁵ It is considered that the highly specific black flies probably also detect subtle odours associated with the host.⁶

Feeding activities

Mosquitoes

The life cycle of mosquitoes is relatively simple with the adults laying eggs on water or damp surfaces prone to flooding, where they hatch to give larvae (wigglers). The larvae feed on microorganisms and organic matter. Moulting occurs several times to give pupae from which the adult finally emerges at the surface of the water. The adults and larvae represent the feeding stages.⁷

Adults possess a flexible proboscis that is suited to penetrating soft surfaces, such as of fruit and skin. The basic food of both adult male and female mosquitoes is nectar and honeydew. Other sources are damaged fruit and leaves, tree sap, sugar cane trash, and regurgitated liquid from ants. Mosquitoes in the genera *Toxorhynchites*, *Topomyia*, and *Malaya* possess mouthparts that cannot pierce vertebrate skin and do not take a blood meal.⁸ Mosquitoes may feed on caterpillars, cicadas, and small dipterans and develop viable eggs. Even though mosquitoes (*Aedes aegypti*, *Culex tarsalis*, and *Anopheles stephensi*) may feed on insect larvae and produce viable eggs, such a meal is inferior to blood.^{4,9} The feeding behaviour on caterpillars and insects (figure 1) may help to explain their transition to blood-feeding activities on mammals, if it is assumed that they were not already facultative blood-feeders before the Fall. Insect haemolymph-feeding may have provided the opportunity for mosquitoes

to come into contact with a suite of microbes that were able to exert a transformative effect on them.

The possession of a proboscis does not mean the mosquito population uses it to draw blood. Not all female mosquitoes require a blood meal to mature eggs for the first time. In these mosquitoes subsequent batches require a protein-rich meal.¹⁰

Black and deer flies

Black flies and deer flies are carriers of a number of diseases, but the one primarily focused on here is river blindness. African eye worm and its insect carrier, deer fly, will be mentioned as information allows.

Black fly adults lay eggs in aquatic habitats. These hatch giving rise to larvae that adhere to surfaces and consume a variety of small food resources (bacteria, algae, small aquatic animals, organic material) present in the moving streams. A non-feeding pupal stage follows and adults emerge within days of eggs being deposited. Adults emerging are winged with most adult females requiring a blood meal before eggs can mature.¹¹ Deer fly larvae develop in high water content areas and feed on organic matter in the soil.¹²

Females of some deer and black fly species can mature a batch of eggs before a blood meal is consumed (autogenous species). Selected deer fly species can satisfy their blood meal requirements from reptiles and birds.¹³ Information on deer flies is rather limited meaning that hereafter our focus will be on black flies and river blindness rather than on African eye worm. Adult black and deer flies consume nectar and honeydew and the latter rotting fruit.¹⁴

Digestion

Blood-feeding brings with it a number of issues. First, the blood must be digested. Examination of the proteins present in saliva of blood-sucking insects indicated that the majority do not have a recognizable function. For components that do have a known function, the major targets are to inactivate elements in the blood-clotting cascade, inhibit platelet activation, and scavenge substances capable of causing pain, itching, and oedema. These features are shown also following an analysis of the salivary gland contents of male mosquitoes (do not feed on blood) found in those genera feeding on blood. They lack many compounds found in females and possess smaller amounts of components that function to dampen coagulation, platelet activity, and inflammation.¹⁵ Each group of insects possesses its own unique group of protein molecules that allow them to function. However, in all cases, common host defences are targeted.¹⁶ The most significant enzyme components identified in a number of blood-feeding insects are serine proteases and their inhibitors, hyaluronidases, and apyrase.¹⁷

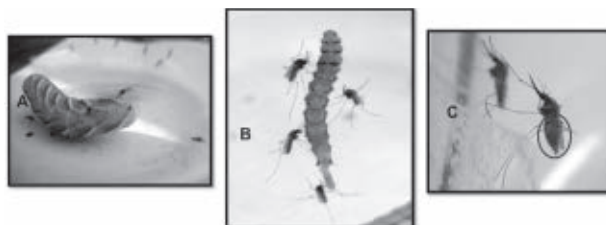


Figure 1. Images show mosquito females near and on insect larvae or caterpillars for feeding: A. Fourth instar *Manduca sexta* larva; B. Fourth instar *Heliothis subflexa* larva; C. *Anopheles stephensi* female (circled) engorged on the haemolymph of a *M. sexta* caterpillar. (From George *et al.*⁴)

Ovarian development

Mosquitoes

Steroid hormones (ecdysteroids) are intimately connected to initiation of yolk formation (vitellogenesis) and egg maturation.¹⁸ When mosquitoes are fed ecdysteroids, then egg development involving protein synthesis is stimulated in the absence of a blood meal. Similar compounds may be available in plants on which mosquitoes feed.¹⁹ Again, this gives some credibility to the suggestion that plant or insect feeding was the original food source for mosquitoes.

Black flies

Again, steroid hormones (particularly 20-hydroxyecdysone) are important to the maturation of eggs. In black flies, levels rise as eggs develop and also rise following blood-feeding, as they are synthesized from dietary cholesterol.²⁰ Plants have the ability to synthesize 20-hydroxyecdysone (at least 78 families). The steroid is structurally identical to that found in insects and has no known function in plants except possibly as a deterrent to insects.²¹ Sterols found in plants and fungi can be used by insects to synthesize ecdysteroids.²² Overall, this allows the suggestion to be forwarded that originally black flies may not have needed to consume a blood meal to mature eggs, but rather existed on insect pupae or even on plants containing an adequate supply of ecdysteroids and protein.

Relationship of disease-causing organisms with their vectors

The relationship of disease agents and their vectors is complex and usually involves a number of stages.

Mosquitoes

The malaria parasite is introduced into the bloodstream through saliva of the mosquito containing cells (sporozoite stage) of the parasite. These cells enter the liver and asexually multiply. When the merozoites are released they attach to red blood cells and penetrate (figure 2). In the blood cells growth and multiplication occurs that eventually results in their lysis. The released parasite can enter other red cells to continue the cycle. The lysis of red cells not only releases parasites, but toxins and debris that cause fever development. Occasionally, a different sequence of events happens in the red blood cells where two types of parasite cells are formed that do not rupture the red cells. When these are ingested by a mosquito, they develop into male and female gametes. A sequence of events now occurs in the mosquito gut and eventually leads to the release of sporozoites, which migrate to the salivary

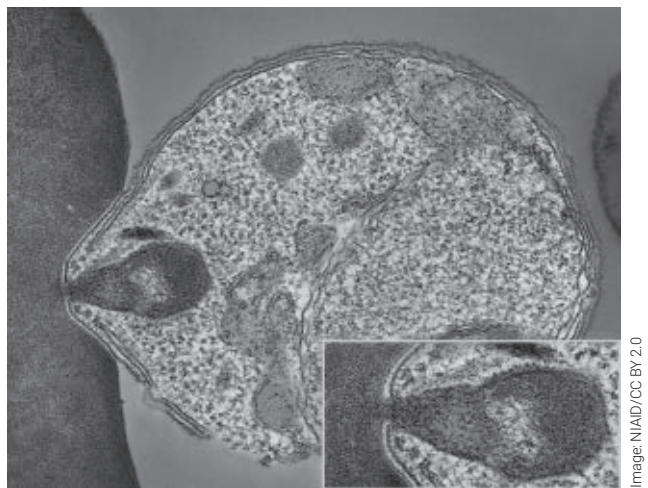


Image: NIAD/CC BY 2.0

Figure 2. Malaria parasite (merozoite) connecting to a red blood cell and beginning to penetrate

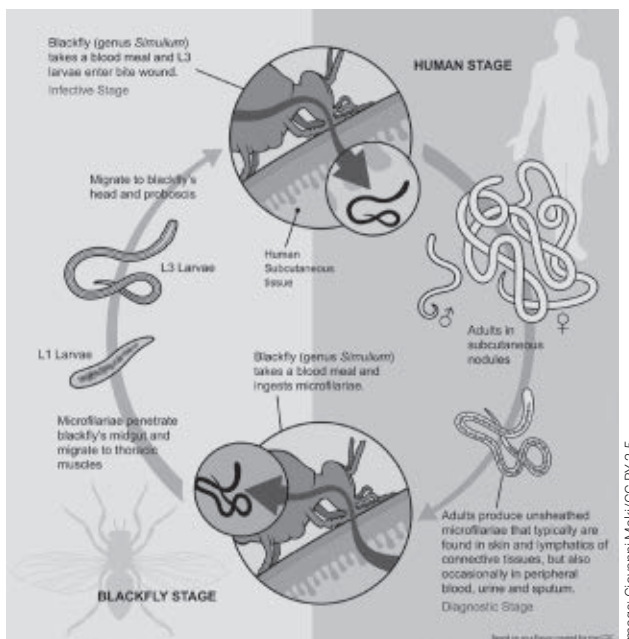


Image: Giovanni Maki/CC BY 2.5

Figure 3. Life cycle of *Onchocerca volvulus*

gland and are then capable of being transmitted through a bite to a new host.²³

Black flies

During an insect bite a third-stage filarial larva is introduced into the bloodstream (figure 3). The black flies transmit mature larvae to humans when the fly is taking a blood meal. These develop into adult filaria in subcutaneous connective tissue (nodules form). The female worms produce unsheathed small worms (microfilariae). These are found in selected body fluids including the blood. A progressive series of events occurs in the black fly before transmission

in a blood meal can take place. The ingested microfilariae penetrate the black fly's midgut and then migrate to the thoracic muscles and finally to the head and proboscis.²⁴

Origin of disease organisms associated with blood-feeding insects

Whether the progenitors of the life forms we now observe are considered to have originated through naturalistic means or through creation, there are unresolved issues in generating reasonable schemes to explain the origin of disease organisms transmitted through blood-feeding insects.

Evolutionary views

Various theories exist among evolutionists on the likely route for the emergence of diseases associated with blood-sucking insects. The solutions proposed are based mainly on comparing genetic and other homologies among organisms and then devising routes of advance from the simple to more complex organisms.

Horizontal transfer of genes through endosymbiotic or other unknown processes is deemed responsible for the added complexity needed to explain the transition of life from primitive to complex forms. Naturally, through this process new genetic information is added to the recipient genome, which is essential if any theory of evolutionary progress is to gain credibility.

The gold standard used by evolutionists in such studies is to construct a phylogenetic tree of supposedly related species. When the genomes of these species are analyzed, horizontal gene transfer supposedly is indicated when a gene sequence(s) is identified in unrelated species. Even this method has acknowledged difficulties because in the first instance there is dispute over phylogenetic relationships. Other methods to detect gene transfer can also be used, but are considered less reliable than the gold standard. Sometimes supposed exchanges have been shown to be totally erroneous.²⁵ Then, too, contamination is an ever present issue. The advice is to provide complete data on the immigrant sequence, integration sites, host genome flanking regions, a sensible transfer mechanism, and a detailed phylogenetic context. These safeguards may not be met. This means that false claims can be made easily.²⁶ Added to these issues are that sampling biases affect interpretation of results even to the extent that instead of the data supporting horizontal gene transfer, vertical transfer and gene loss may be a more realistic possibility.²⁷

The basic problem with this approach is that homology does not indicate kinship. It simply represents the fact that different organisms possess similar strategies to achieve related outcomes.

Malarial parasites

The route for the possible emergence of the malarial parasite has attracted considerable interest. Several of the leading ideas will be mentioned.

The malaria organism belongs to a group that contains a plastid (double membrane organelle) that has marked similarities to those possessed by photosynthetic algae, although in malarial species the plastids have lost their photosynthetic ability. Consistent with this loss of ability, many genes are missing. The suggested pathway leading to the transformation of non-pathogen to obligate pathogen remains obscure, but it has been noted that some of the genera related to the malaria organism are parasitic on marine invertebrates.²⁸ Two genera of colpodellids (*Chromera* and *Vitella*) have been the focus of scientific attention. The chromerids are closely associated with corals.²⁹

The colpodellids are a group of single-celled eukaryote organisms. They show a variety of interactions with other organisms including commensalism, predation, and parasitism (intracellular). They have a decisive role in the regulation of protists and algal communities in aquatic habitats. If these organisms were modified to give rise to the malaria organism, it has been suggested that horizontal gene transfer as well as gene loss would need to have been involved in the appearance of apicomplexan parasitism.³⁰

A postulated place for such an event to take place is in the larval mosquito gut. An array of food is ingested, including algae, bacteria, diatoms, protozoa, rotifers, and crustaceans.³¹ Since the colpodellids are small (<20µm), possess even smaller cysts and have a motile zoospore stage,³² ingestion would not be an issue. However, no suggestions are made on how coral-associated organisms (marine) interacted with mosquito larvae (freshwater/brackish) or of the interactions occurring in salivary glands and the larval mosquito gut to help providence or gene transfer in the natural environment.

Other possibilities mentioned are that the malaria organism was modified from some of the blood parasites of frogs and snakes capable of being transmitted by ingesting mosquitoes.³³

The life cycle of two *Hepatizon* species found in frogs (*Rana*) have similarities to that shown by the malaria organism including the occurrence of asexual reproduction in frogs with merozoites invading erythrocytes and asexual reproduction in mosquitoes. Sporocysts are formed in the Malpighian tubules of the mosquito and represent the final stage of the sexual cycle. The organism is transmitted to frogs through ingestion of the mosquitoes. Asexual reproduction takes place in the liver of frogs using one round of merogony (1 to 2 rounds for *Plasmodium*). The merozoites produced invade erythrocytes and then are transformed into gamonts (sexual stage) through binary fission. Mosquitoes acquire the parasite by feeding on infected frogs.³⁴ Adaptation of

such parasites to the constant high temperature found in mammals is one issue these parasites would face.³⁵ Nothing is known of the ability of *Herpatazoon* species to survive under such conditions. More fundamental issues, such as adaptation of the metabolism to a new host and the ability to avoid destruction by the immune system, would also be faced. Adaptation to a human host would present major challenges unless it was genetically programmed to cope with significantly different physiology including endothermy and unique features of the human immune response.

Such barriers may have been less formidable than imagined as it has been shown recently that, in experimental situations, mice could become infected by a *Hepatazoon* parasite of snakes (*H. ayorgbor*) and could in turn transmit the organism to snakes when consumed.³⁶

Filarial parasites

Black flies are often infected with nematodes, bacteria, fungi, protozoa and viruses.³⁷ It is known that there are some nematode pathogens of the fly larvae (Merminthids) and sometimes these parasites persist into the adults. They are free living as adults and have affinities to other nematodes parasitic as animal and plant pathogens.³⁸ Further, some nematodes carried by black flies infect the vertebrates they feed on and cause disease.³⁸

Such infection has been linked with data coming from the study of *Wolbachia* bacteria (figure 4), which many filarial parasites carry, including *O. volvulus* (river blindness nematode). The bacteria are transmitted to the next generation of insects via eggs. They appear to have a contributing role to the parasitic nature of the worms on other hosts or to interfere with the host immune response. Indeed, antibiotics can render the nematodes ineffective in causing disease, which establishes that *Wolbachia* performs a vital function in the nematode's lifestyle.³⁹

Gene transfer from the *Wolbachia* bacteria to arthropods and nematodes (eukaryotes) that carry them is touted as a distinct possibility in some circles, since these organisms

are closely associated with germ-line cells. An intriguing example of putative transfer has been cited in the adzuki bean beetle (*Callosobruchus chinensis*). Genes in the X chromosome of the beetle are identical to those of the bacterium it carries.⁴⁰ The *Wolbachia* bacteria, which are abundant and widespread in insects, do not have an independent existence, and also manipulate the insects' reproductive biology.⁴¹

One problem with the African eye worm is that it does not carry the *Wolbachia* bacteria. However, remnants of gene sequences from the bacteria are thought to be present in the African eye worm filarial nematode and a related rodent parasite (*Acanthocheilonema viteae*).⁴² If this is so, these sequences or other changes wrought by the insertion of genetic material are thought potentially responsible for the pathogenic abilities now shown by the eye worm parasite.⁴³

Creationist views—what changed immediately after the Fall?

It is speculative to suggest that insects with biting mouthparts used fruit and other plant tissues as their original food source and their move to imbibing blood may have developed after the Fall. However, an apparent adaptation for blood-feeding propensities has been observed in adult male fruit-feeding moths of *Calyptra thalictri*, which may give some strength to such an argument.⁴⁴

Many taxa among the arthropods and nematodes form symbiotic relationships with prokaryotes. These symbiotic organisms can provide essential nutrients and other factors required for their reproduction and survival. The benefits may extend to providing defence against damaging organisms and limitation of stress from environmental factors. Not all of these bacteria may now confer benefits on the host. Those bacteria that have successful beneficial relationships with hosts possess smaller genomes than their free-living relatives.⁴⁵

One reasonably can consider that beneficial (mutualistic) relationships among living organisms was the creation norm. This proposition is given strong credibility by the observation that a majority of plants form such relationships with microbes and other groups of living organisms have strong dependent relationships on unrelated groups.⁴⁶

There is another body of thought among some creationists that death of organisms with no conscious feeling of pain occurred before the Fall (e.g. birds eating insects, phagocytic cells in the mammalian body disposing of bacteria entering the bloodstream). Some prefer to think that negative reproductive feedback mechanisms were in operation. Whenever disease organisms appeared, their emergence can be explained with varying degrees of success by invoking known phenomena facilitating gene transfer (transformation, transduction, and anastomosis), as has been shown elsewhere.⁴⁷ Some of these and related phenomena have been shown to give rise to new pathogens in nature.

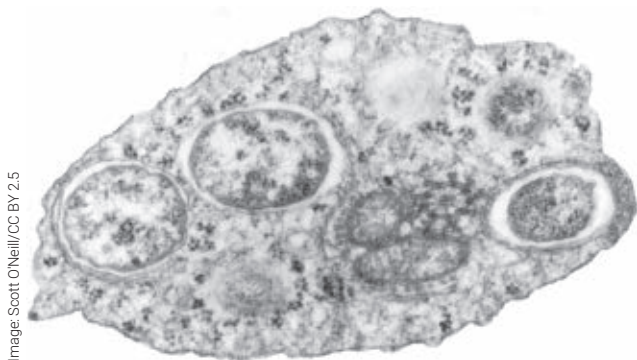


Figure 4. Transmission electron micrograph of *Wolbachia* within an insect cell

After the Fall, the design functions of the human body began to operate sub-optimally (Genesis 3:16—childbirth). This perhaps gives licence to suggest that malfunctions and mistakes would be noted in other life forms involving a range of processes. It could be expected from the above text that such changes would begin to appear in the short term.

Changes through time

For creationists, theories embracing insects predacious on others (entomophagous insects) and/or plant-sucking insects as the commencing point⁴⁸ appear to be the ones likely to be most attractive. A significant point is that both insect groups, that are the focus of this article, have the ability to pierce surfaces and obtain nourishment from living tissues. This ability, we carefully note, is in life forms that do not possess conscious feeling of pain.

Mammalian biting ability of mosquitoes

Some suggestions are made relating to malaria that could appeal to creationists. *Wyeomyia smithii* is a species that lives as a commensal in the water-filled cavities of the purple pitcher plant (*Sarracenia purpurea*—figure 5).⁴⁹ Biting, disinterested non-biting, and obligate non-biting populations of this mosquito have been identified. These populations are fully inter-fertile. Biting propensity in a low-biting population can be increased by selective manipulation.⁵⁰ If the creation starting point was the obligate non-biting group of mosquitoes this ostensibly makes for a more comfortable argument. However, transitioning to a mammalian feeding habit would expose the mosquito to the problem of acquiring the ability to digest haem and contend with toxic metabolites.

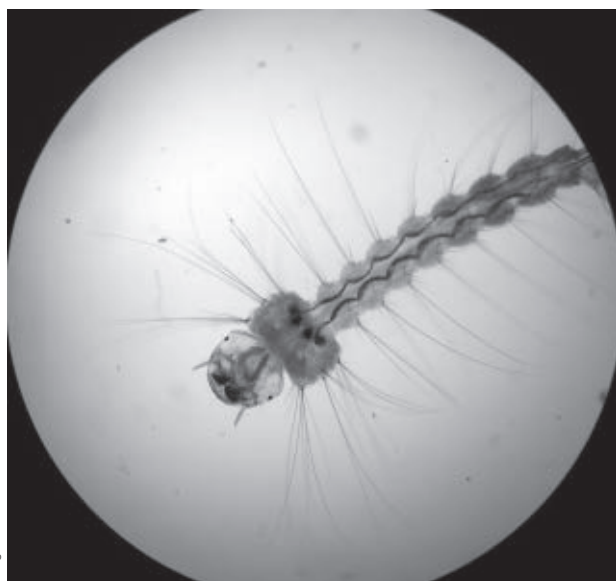


Figure 5. *Wyeomyia smithii* larvae in the leaves of the pitcher plant *Sarracenia purpurea*

These may represent considerable hurdles. Further advances in explanation will be possible as scientists investigate the abilities held in both biting and non-biting insects.⁵¹

Not surprisingly, differences in gene expression have been identified among the three populations with the greatest difference seen between the biter and obligate non-biter population. The difference in differential gene expression between these two populations was five percent. The obligate non-biters were more flexible in their ability to adapt to changing environmental conditions. The biters, on the other hand, on account of partaking of a blood meal, sustain a cost in terms of metabolic activity, such as the need to breakdown hemoglobin, dispose of the toxins released, and to emphasize olfactory rather than visual inputs in seeking a food source. Some of the differences could be accounted for by changes in gene expression levels. In contrast to the proposal with which creationists would be comfortable, the supposed evolutionary sequence is from biter to obligate non-biter.⁵²

If the salivary gland enzymes are considered in general, the most significant enzyme components identified in a number of blood-feeding insects are serine proteases and their inhibitors, hyaluronidases and apyrase. Now, similar enzymes are found in the plant kingdom or among some bacteria. No one has provided a convincing explanation how blood-feeders acquired these enzymes.¹⁷ Is it possible that the appropriate genes and small amounts of the key enzymes were present in the insect population, with selection and increased gene expression taking place after the Fall? Alternatively, or in addition, there may have been a microbe assisted transfer of phage carrying regulatory factors capable of increasing gene expression.

It has been noted that hyaluronidase activity can be phage encoded or associated with the phage particle, as in streptococci.⁵³ It also has been observed that the mosquito genome contains plant-like sequences. It has been postulated that these may have been acquired as a consequence of the plant-feeding habits of the insect with input from the unique microbiota present in its salivary gland and midgut.⁵⁴ This may be conceptually possible perhaps after the fashion of events noted in a *Chlorella*-like green alga. When this alga was infected with a virus carrying the hyaluronan synthase gene, the alga was able to synthesize the gene product within 15–30 minutes of infection. The representative polysaccharide (hyaluronic acid) appeared on the outside of its cell wall.⁵⁵

Malarial parasite origin

The origin of the malarial parasite remains a mystery but the best possibility seems to reside with a group of apicomplexan organisms found in frogs. It is possible that parasites related to the present genus *Hepatizon* were creation companions of frogs and exerting no adverse effects upon the creatures. This situation may have changed after

the Fall. Today, *Hepatazoon* species are found in frogs and show many similarities to the life cycle now displayed by the malaria organism and furthermore they can be transmitted by mosquitoes, as mentioned in the last section. The suggestion made here is that originally these parasites lived in a balanced relationship with the host causing no adverse effects and perhaps even conferring some benefits. In some animals, such a postulated relationship may show similarities to those observed currently.⁵⁶

Altering the complex interactions between parasites and their hosts and among microbes in a host may have dramatic consequences. In mosquitoes, modifying the immune response of the insect by gene manipulation of a transcription factor renders it almost completely resistant to malaria parasite transmission,⁵⁷ which illustrates the effect of small changes in gene structure on outcomes.

Mosquito species of primary significance in hosting the malaria parasites do not generally carry *Wolbachia* bacteria. Their ability to do so can be significantly reduced if the bacterium is artificially introduced, as can their ability to transmit two virus disease entities.⁵⁸ How a postulated loss of *Wolbachia*, a change in a key transcription factor, or other related changes might have occurred is at present not known.

Black flies and filarial parasites

A satisfactory explanation for the blood appetites of black flies and their ability to transmit filarial parasites is more difficult to explain than in mosquitoes with malaria. It has been noted that not all black flies with well-developed mandibles bite.⁵⁹ The nutrients in blood theoretically are capable of being accessed from plant sources.²¹

Could it have been possible that the filarial parasites arose from the Merminthid nematode parasites of black flies with the aid of bacterial symbionts? Clearly, the process would have been an extended one for first the disease-causing nematode parasites of the black flies need to be explained. This could potentially take the line that some nematodes were designed to regulate insect populations. There are well-known examples of such regulation. Some of these nematodes are associated with bacterial symbionts that assist them in their controlling activities.⁶⁰

Manipulation of gene expression through the microbiota in insects

Is it possible that the DNA of endosymbiotic bacteria may have been incorporated into the eukaryote nucleus of the host and changed its function? In order to answer this question, several examples can be mentioned. For example, the pea aphid (*Acyrtosiphon pisum*) requires the presence of a symbiont bacterium (*Buchnera*) to function and the bacterium also requires the aphid. At stages of host development the bacterium and germ line cells are

not separated by membranes. Certain genes carried by the aphid are similar to prokaryote genes, and these are essential for viability. Where these genes originated from is a baffling question as it seems they are similar to those of bacteria that are present only sporadically in these insects. This pattern occurs in other insects studied—the DNA does not come from the symbiotic bacteria usually present.⁶¹ Indeed, it is acknowledged that many prokaryote-type genes appear in eukaryotes.⁶² At the moment, there are enormous gaps in our knowledge, leaving us to indicate again that gene similarity in nature does not necessarily indicate the original source of derivation of the gene or whether the “homologous” gene was created independently in several taxa.

Altering the complex interactions between parasites and their hosts and among microbes in a host may have dramatic consequences. The immune response of mosquitoes can be modified by transcription factor manipulation so that it is almost completely resistant to malaria parasite transmission.⁶³ This represents an area deserving more extensive study. As already mentioned, mosquito species hosting the malarial parasites do not generally carry *Wolbachia* bacteria. Their vectoring ability can be significantly reduced if the bacterium is artificially introduced.⁵⁸ Is it possible that a postulated loss of *Wolbachia* was a key event in the emergence of malaria in its present form?

Concluding remarks

Accounting for the presence of destructive parasites is a challenging exercise. Some progress has been made in this direction with mosquitoes and black flies. With both these groups it is suggested that plant and even invertebrate feeding occurred originally. These insects now would have had expanded food gathering possibilities, ostensibly acquired as ecological conditions changed and food resources became scarcer and less nourishing as a result of the Curse. Alternatively, dispersal to other localities may have occurred giving greater food gathering opportunities. It is possible that adaptive processes could account for many of these changes. This could include expression of front-loaded genetic material or information coming from elsewhere as a result of microbial assisted transfer. Currently, insufficient detail is known about the insects, their salivary enzymes, changing conditions, the parasites they vector, associated bacteria affecting these relationships, horizontal gene transfer, and other unknowns, to make any conclusive remarks.

The origin of malaria parasite and the river blindness parasite carried by insects also poses problems. However, the problems are much worse for those approaching the problem from a naturalistic evolutionary perspective. Parasitic nematodes capable of controlling insect populations are a possible source from which the river blindness parasite arose. Such an event would have involved an ecological

niche change for the vector and the parasite, conceivably involved gene transfer acquisition and/or loss through known mechanisms. Mosquitoes are hosts to nematodes, fungi, bacteria, protists, viruses, and other microscopic organisms. The similarity of the malaria parasite to mosquito-transmitted organisms in frogs suggests a possible origin. The postulated loss of a mosquito-associated bacterium may have assisted in the ability of the parasite to develop in its present form.

The proposed wide movements of genetic information across recognized genera by evolutionists often cannot be accomplished in the laboratory and in many instances are not accompanied by reasonable suggestions of mechanisms that would facilitate such exchange in the natural world. This means that many of the ancestral schemes constructed are without a sound foundation. In all instances where genetic exchange has been demonstrated experimentally, the recipient organism is still recognizable. It may have acquired some new abilities or lost some capabilities, but its basic structural and functional features are recognizable as belonging to a particular group of organisms.

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Feathered pterosaurs: ruffling the feathers of dinosaur evolution

Joel Tay

In December 2018, researchers claimed to have found featherlike structures in two specimens of pterosaurs.¹ These appendages, called pycnofibres when found in pterosaurs, were said to resemble non-vaned group filaments and bilaterally branched filaments—structures previously thought to be unique to maniraptoran dinosaurs and which have been previously used as evidence that some dinosaurs had feathers. The researchers claim that these pycnofibres are diagnostic of feathers. However, of the four types of pycnofibres they identified in one pterosaur, three were said to be similar to ‘protofeathers’ previously thought to be unique to unrelated groups of dinosaurs. But why would all these diverse dinosaur ‘protofeather’ types be present in one single pterosaur specimen? This paper compares decayed collagen fibres in marine fossils to these pterosaur ‘pycnofibres’ and suggests that these integumentary structures are identical. But if these pterosaur ‘pycnofibres’ are nothing more than decayed collagen fibres, so too are the three types of dinosaur ‘protofeathers’ associated with it. This presents a challenge for those who choose to interpret ‘dino fuzz’ as evidence of feathered dinosaurs.

History of evolutionary thought on the origin of birds

Dinosaurs are a unique class of terrestrial (i.e. ground-dwelling) reptiles. Thus, pterosaurs are not dinosaurs but flying reptiles. Nevertheless, to understand why some evolutionary researchers think that pterosaurs were feathered, we need to trace the history of ‘feathered dinosaurs’.

As far back as 1868, evolutionists such as Thomas Huxley taught that birds evolved from dinosaurs long before there was any evidence of fossil ‘feathered dinosaur’ candidates. So it was a theory that had little supporting evidence.

In the 1980s, Jacques Gauthier injected new life into the debate by presenting a more nuanced cladistical model where he argued that theropod dinosaurs evolved into modern birds.² Many evolutionists regarded Gauthier’s paper as pivotal to the idea that theropod dinosaurs evolved into birds, and his paper is still often cited by evolutionists today.

In 1996, a dinosaur fossil (*Sinosauropteryx*) was found that featured a fuzzy vagueness along its back and on various parts of its body (figure 1). Evolutionists declared that this hairlike feature showed that some dinosaurs evolved into birds and that the fuzzy structure were some kind of protofeathers or precursor to bird feathers. In their published paper, the authors declared that the fuzz resembled modern bird feathers and they may have been hollow. However, they also added a caveat. They wrote: “the... [fuzzy] structures are piled so thick that it has not been possible to isolate a single one for examination”.³ Neither light microscopy nor detailed examination of these structures were carried out. Are these really feathers?

So, what are these fuzzy structures? In 2007, two secular scientists, Theagarten Lingham-Soliar and Alan Feduccia,

teamed up to study these integumentary structures in detail. They examined this ‘dino fuzz’ using scanning electron microscopy and came to a surprising conclusion—the fuzzy structures were neither feathers, nor were they hollow, but were instead identical to partially decayed collagen fibres in skin. Feduccia even noted that the ‘dino fuzz’ on *Sinosauropteryx* was not even on the surface of the creature but within the confines of the body outline.⁴

The duo carried out further experiments including burying dolphin carcasses for a year before studying them in their partially decayed state with SEM and chromatographic analysis. They compared the ‘dino fuzz’ in *Sinosauropteryx* with similar structures found in fossil pterosaurs, fossil ichthyosaurs, and decayed carcasses of dolphins and sharks. All these creatures presented identical hairlike structures on their fossils/carcasses. But ichthyosaurs, dolphins, and sharks do not fly, nor do they have feathers!

On the dolphin carcasses, Lingham-Soliar noted that:

“These degraded fibres presented almost limitless pattern permutations, in many instances showing featherlike patterns that are strikingly similar to many of those identified as protofeathers in the Chinese dromaeosaurs and including a wavy appearance of the allegedly external ‘appendages’ reported in the fibres preserved with the Early Cretaceous dromaeosaur *Sinornithosaurus millenii*, which Richard Prum cited as illustrating a critical stage in his filament-to-feather evolution model.”⁵

They also examined several pterosaur fossils and noted that many of them displayed features identical to what was present in both dinosaur as well as marine reptiles.

“To add to the confusion, the same fibrelike

structures of *Sinosauropteryx* are found in a primitive ceratopsian (ornithischian) dinosaur, *Psittacosaurus*, and another unrelated ornithischian, a group thought to have no relation to the origin of birds, as well as a variety of pterosaurs from various ages and localities, including the Early Cretaceous Chinese rhamphorhynchoid pterosaur *Jeholopterus*.⁶ [Notice that these authors mention that pterosaur fuzz is similar to what we see in dinosaurs.]

“A miscellany of pterosaurs, including primarily pterodactyloids, and a few rhamphorhynchoids, some, such as *Jeholopterus*, exhibiting ‘hairs’ resembling the hairlike integumentary filaments of the dinosaur *Sinosauropteryx*. There is also the very small, arboreal pterosaur *Nemicolopterus* ...”⁷

After detailed examination of alleged ‘dino fuzz’ they concluded that all reported cases of protofeathers in dinosaurs, marine reptiles, and flying reptiles alike, “show a striking similarity to the structure and levels of organization of dermal collagen. The proposal that these fibres are protofeathers is dismissed.”³ What was previously identified as pycnofibres in pterosaurs turned out to be just “collagen and keratin structural fibres” (figure 2).⁸

Lingham-Soliar’s and Feduccia’s work is currently the most detailed study on the taphonomy of integumentary structures.¹⁰ Yet for most part, a lot of their work has been deliberately ignored by evolutionists for good reason—if these strandlike structures are common in dinosaurs, flying reptiles, marine reptiles, sharks, and even dolphins, they cannot be feathers and they convey no evolutionary significance. But for many evolutionists, ‘feathered dinosaurs’ have become a sort of religious dogma for the origin of birds. If these fossil artefacts were to be reduced to just collagen fibres, the central lynch-pin in dinosaur-to-bird evolution collapses. As Gauthier, a critic of Feduccia, admits: “We basically try and ignore [Feduccia]. For the dinosaur specialists, it’s a done deal [i.e. the idea that dinosaurs developed feathers and evolved into birds], ... the bird people trust him, and so he’s poisoning his own discipline.”¹¹

Unfortunately, since the 1996 paper that alleged to have found protofeathers in *Sinosauropteryx*, other evolutionists have been quick to attribute every kind of fuzzy appearance in dinosaur fossils to feathers without regard to its dermal taphonomy.

As Storr Olson, Emeritus Curator of Birds at the Smithsonian’s National Museum of Natural History, explains:

“The idea of feathered dinosaurs ... is being actively promulgated by a cadre of zealous scientists acting in concert with certain editors at *Nature* and *National Geographic* who themselves have become outspoken and highly biased proselytizers of the faith.”¹²

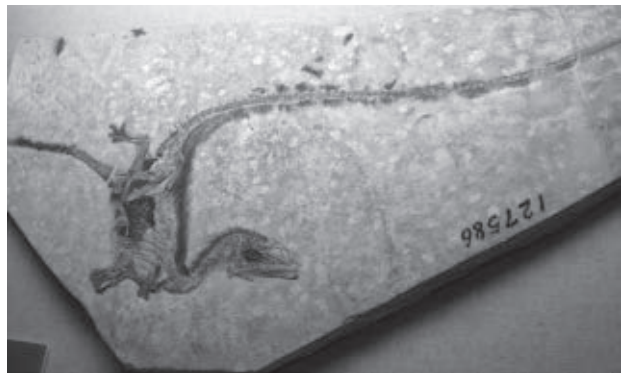


Figure 1. Specimen NIGP 127586. The fuzziness on this specimen of *Sinosauropteryx* was interpreted by many as evidence that some dinosaurs had a type of furry covering of protofeathers.

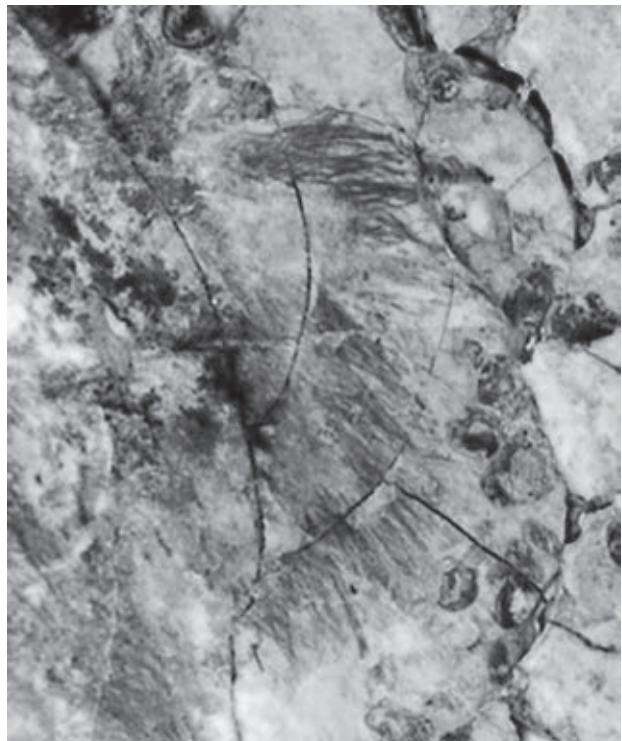


Figure 2. Integumental structures preserved in an Early Cretaceous Chinese pterosaur *Jeholopterus* appear similar to the so-called protofeathers of dinosaurs from the same deposits (figure 4.38 from Feduccia⁹). Researchers have known about these hairlike structures on pterosaur fossils for many years and some have previously concluded that these are just collagen fibres.

Pycnofibres: filamentous structures in pterosaurs

But what have alleged dinosaur ‘protofeathers’ got to do with pycnofibres in pterosaurs? When these filamentous structures are present in pterosaurs, they are called pycnofibres. Pycnofibres have been reported in various specimen of fossil pterosaurs as far back as 1831—even before alleged ‘protofeathers’ were identified in

Sinosauropteryx.¹³ The current popular interpretation of pycnofibres as some type of dino fuzz in pterosaurs has been especially popular since 1971.¹⁴ Since that time, numerous papers have been published that concluded that these simple hairlike artefacts were anything from flexible short hairlike fibres to antecedents of protofeathers.

In 2015, Theagarten Lingham-Soliar concluded in his comprehensive two-volume work on *The Vertebrate Integument* that what has commonly been identified as protofeathers in dinosaurs were very likely to be just collagen fibres from partially decayed skin.¹⁵ He concluded that the strandlike integumentary structures seen in pterosaurs are identical to those found in *Sinosauropteryx* as well as several other Chinese taxa, and these are all unlikely to have anything to do with feathers.¹⁶ This poses a conundrum for evolutionists—how can the fuzzy structure in dinosaur fossils be protofeathers if the exact same structures are also found in not only dinosaurs, but also pterosaurs and marine creatures not regarded as on the evolutionary line to birds?

In *The Riddle of the Feathered Dragons*, Alan Feduccia explained:

“Given that Xu and colleagues suggested that there is ‘a potential primary homology among the integumentary feathers’ of theropods such as *Beipiaosaurus*, the ornithischians *Psittacosaurus* and *Tianyulong*, and some pterosaurs, such a proposal would ‘push the origin of monofilamentous integumentary structures into the Middle Triassic at least’. As has been noted, some pterosaurs share filamentous structures indistinguishable from the dino-fuzz present on so many of the Early Cretaceous fossils and most recently Zheng and colleagues have included still another ornithischian, the heterodontosaurid *Tianyulong*, to the list of dinosaurs and archosaurs associated with feather origins, ranging from herbivores and small meat-eating coelurosaurs to the large, flesh-eating tyrannosauroids [emphasis added].”¹⁷

Note that this quote from Feduccia’s book was written six years before the recent 2018 article—but Feduccia’s work was never cited in the recent 2018 publication which declared that pterosaurs had ‘protofeather’/furry covering. In other words, it has been known for quite a while that the partially decayed collagen fibres of marine reptiles and mammals, are indistinguishable from pycnofibres in pterosaurs and protofeathers in dinosaurs.

Compare the drawing of decayed collagen in ichthyosaur with the branching pattern of pterosaur pycnofibre in figure 3. Also, compare the photos within figure 4 and within figure 5.

Protofeather advocates have previously tried to argue that the hairlike structures found in dinosaurs are protofeathers, and that these are different from the furry structures seen in pterosaurs. When found in pterosaurs, this distinction is made by calling them pycnofibres. It is claimed that pycnofibres

are different from what is seen in marine reptiles, sharks, and dolphins, even though (as demonstrated in the photos) these structures appear almost identical. What sets this recent December 2018 paper apart from previous papers on pterosaur pycnofibres is that this paper claimed that these are feathery structures, yet at the same time acknowledges that their pterosaur specimen had structures previously thought to be unique to certain specific groups of dinosaur fossils. They grouped the pycnofibres in their pterosaur specimen into four categories, three of which are similar to what has been observed in dinosaurs.²²

The four types of pterosaur pycnofibres were described as:²³

Type 1: Resembling monofilaments in the ornithischian dinosaurs *Tianyulong* and *Psittacosaurus* and the coelurosaur *Beipiaosaurus*.

Type 2: Resembling the brushlike bundles of filaments in the coelurosaurs *Epidexipteryx* and *Yi*.

Type 3: Resembling bristles in modern birds, but did not correspond to any reported morphotype in non-avian dinosaurs.

Type 4: Identical to the radially branched, downy featherlike morphotype found widely in coelurosaurs such as *Sinornithosaurus*, *Beipiaosaurus*, *Protarchaeopteryx*, *Caudipteryx*, and *Dilong*.

Type 1, 2, and 4 are said to resemble what has been previously observed in dinosaur fossils. Type 4 is the dense

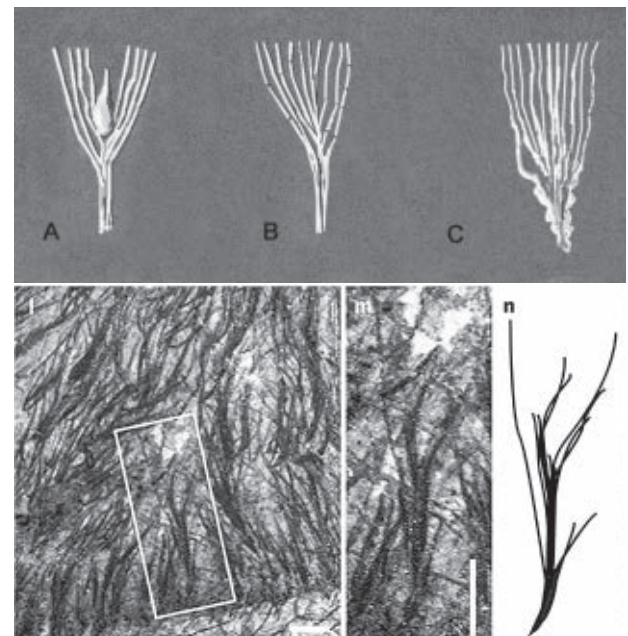


Figure 3. Comparison of the schematic drawing of various permutations of decayed collagen in ichthyosaur (top) (figure 7:A–C in Feduccia et al.¹⁸) with the branching pattern of pterosaur pycnofibre (below) (figure 1:i–n in Yang et al.¹)

downy filaments that are alleged to have covered the wings of these pterosaurs.

Whether this classification is accurate would require another paper altogether, and there is good reason to believe that this classification is inaccurate. For example, photos of the actual pterosaur filaments appear ‘strandlike’ in contrast to the covering of *Protarchaeopteryx* and *Caudipteryx* (which were probably secondarily flightless birds rather than dinosaurs) which have been found with pennaceous feathers, and these are again quite different from the rodlike structures seen in *Beipiaosaurus* (therizinosaur).^{24,25} Yet the paper classifies *Protarchaeopteryx*, *Caudipteryx*, and *Beipiaosaurus* together as Type 4 feathers. However, for the sake of argument, in this paper, we will assume that the classification of the four types of feathers is accurate. Even then, the authors point out that three out of four types of pterosaur pycnofibres found match those previously thought to be unique to some types of dinosaurs. So why are all these unique types of protofeathers/pycnofibres found together in one single specimen of pterosaur?

The most parsimonious explanation for such a phenomenon is that these fine structures are just permutations of the same original integumentary gross structure. That is, these are just typical shapes of degraded collagen fibres. But if these structures are just collagen fibres, then so too are the same structures when found in dinosaurs featuring Types 1, 2, and 4. Since feathered dinosaurs are non-negotiable for many evolutionists—instead of admitting that dinosaurs

did not have feathers, they turn around and claim that these pterosaurs must likewise be covered in feathery, hairlike structures. But this explanation still fails to explain the presence of these structures in marine reptiles, sharks, and dolphins, or why one completely unrelated creature (i.e. a pterosaur) would have similar integumentary structures previously assumed to be unique to so many different groups of dinosaurs.

The researchers in the feathered pterosaur paper acknowledged that they did not know the ‘affinities and function’ of these pycnofibres and even acknowledged that these structures appeared to take on a variety of different forms depending on where they are found on pterosaurs. But that did not stop the authors from speculating further that these structures may have played a role in thermoregulation, tactile sensing, signalling, and aerodynamics. But this imaginary function is nothing more than a just-so story not supported by any scientific evidence. If anything, the presence of a furry covering on the wing membrane is likely to be maladaptive as the following discussion will show.

Hairlike structures on wing membranes are maladaptive

In birds today, baby ostriches are known to be vulnerable to hypothermia and may die if they are caught in the rain without shelter from their mother’s wings. This may have been even more problematic for flight-capable pterosaurs since such a furlike covering would become wet in the rain and accelerate body heat dissipation. The developmental objective is for ostriches to outgrow this stage of feather development as soon as possible.²⁶

Hair is not aerodynamic, and it is likely to pose a problem for flight. For example, bats are covered with fur on some parts of their bodies, but the main aerodynamic parts of their wing membranes are almost entirely hairless. The wing membrane in bats mainly consists of a thin but strong collagenous and elastic fibre centre, probably not too unlike pterosaurs. Even then, if bats are caught in rain, they spend 20 times more energy during flight than at rest, compared to 10 times more energy during flight when dry, because they need more energy to keep their bodies warm,

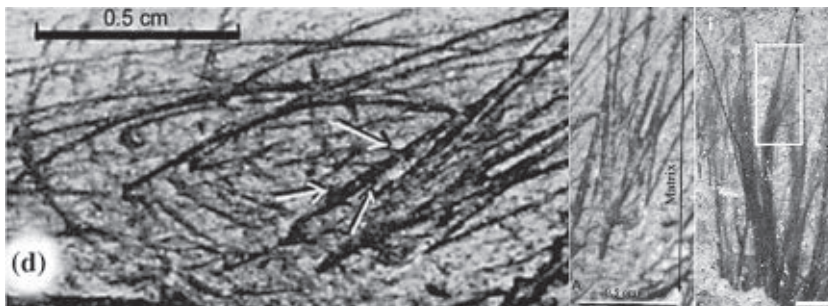


Figure 4. Ichthyosaurus partially decayed collagen fibres (left) (figure 6.1d from Lingham-Soliar¹⁹) and (centre) (figure 5A from Feduccia *et al.*²⁰); vs alleged pterosaur ‘fur’(right) (figure 1i from Yang *et al.*¹). What have been called ‘feathers’ in pterosaurs and dino ‘fuzz’ are indistinguishable in appearance from partially decayed collagen fibres in marine reptiles and mammals. These structures are not protofeathers/pycnofibres, but probably just partially degraded collagen fibres.

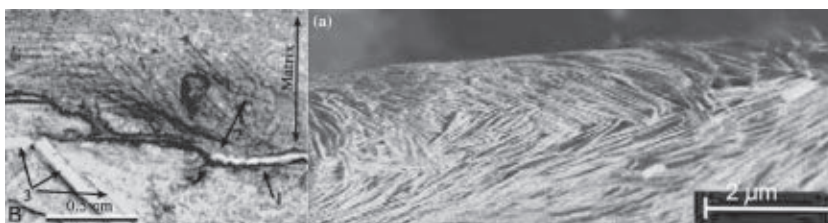


Figure 5. Ichthyosaurus collagen fibres showing featherlike branch (left) (figure 5B from Feduccia *et al.*²⁰) and (right) (figure 2.27a from Lingham-Soliar²¹).

and because their fur clumps together when wet, making them less aerodynamic.²⁷ How much more energy would a pterosaur have to expend if not just their body and head, but if their entire wing membranes were covered in a thick furry layer of pycnofibres?

The intricacies of flight are well known. Many birds have an alula—usually three to five thumb feathers on the leading edge of the wing that reduces drag when the bird is flying at low speeds. A single feather alone can make a big difference to its flight capability. Yet now we are to assume that a pterosaur had dense furry non-aerodynamic hairline structures on its entire wing membrane without impeding its ability to fly! Researchers have the right to speculate on the function of pterosaur pycnofibres—assuming these are indeed dense hairline structures—but they bear the burden of demonstrating that their speculation would not be maladaptive or possibly lethal to pterosaurs.

Melanosome and keratin

The researchers in the 2018 pterosaur paper also claimed to have found evidence of preserved pigment microbodies in two pterosaur fossils—structures responsible for colour. They also claimed to have found roundish carbonaceous microbodies that resembled fossil melanosomes, but this is controversial, and some paleontologists remain skeptical that these roundish microbodies are even melanosomes. Lingham-Soliar for example, has often criticized dinosaur-to-bird evolutionists for automatically labelling as melanosomes all roundish microbodies of a certain size:

“A blanket view that all sinuous structures in the Chinese dinosaurs were ‘protofeathers,’ is now being compounded by a blanket view that all micro-particles found in the same integumental structures are melanosomes.”²⁸

Lingham-Soliar argues that claims to have discovered phaeomelanosomes in fossils and then “divining color [their colour] ... are totally without merit.”²⁸

But even if we grant that these are indeed melanosomes, it still does not prove that these pterosaurs are covered in a featherlike covering. Why? Simply because melanosomes are also found in hair and skin, so their presence is not a diagnostic characteristic of feathers.

Furthermore, two types of melanosomes are often attributed to fossils: rod-shaped eumelanosomes, and the more commonly identified round-shaped phaeomelanosomes. The researchers claimed to have found phaeomelanosomes, but phaeomelanosomes are not found in any extant reptiles today—so why should we even assume that these microbodies are even melanosomes?

In addition, infrared spectroscopy (FTIR) of the pterosaur specimen was said to be, “more consistent with α -keratin

... than β -keratin”.¹ But again, α -keratin is found in all vertebrates, and is also present in skin, so this is not diagnostic.

Finally, the authors of the feathered pterosaur article acknowledge that unlike hair and feathers, pycnofibres are “more superficially attached than the deeply rooted hairs of mammals”.¹ All these fit much better with the decayed skin collagen hypothesis.

Conclusion

Rather than showing us that pterosaurs were feathered, the evidence actually shows otherwise. Pterosaur ‘pycnofibres’ are likely just collagen and keratin structures in their partially degraded state. The most likely reason why anyone would call these fibres feathers is that they are indistinguishable from what was previously identified as protofeathers in dinosaurs.

Conversely, if these pterosaurs were not feathered, neither were dinosaurs. This would demolish the central pillar in dinosaur-to-bird evolution. Thus, in order to avoid this conclusion, some evolutionists now claim that pterosaurs must have likewise been covered in a protofeatherlike covering. However, this explanation is inadequate since the integumentary structures are also found in decaying carcasses and fossils of featherless sharks, marine reptiles, and dolphins.

To consistently maintain the idea of feathered pterosaurs, three conclusions present themselves:

1. ‘Convergent evolution’ of feathers multiple times—once in Aves, then again in early ‘stem birds’ such as *Archaeopteryx*, and then again for pterosaurs. The pterosaurs would then have to independently evolve similar feathery structures identical to three different and unrelated types of ‘dinosaur protofeathers’, and then group them together in one single creature. To put it plainly, it is unscientific wishful thinking; or:
2. Push the origin of feathers way back in time before the dinosaurs, to the supposed age of the archosaurs—but this would require first rejecting current theories of dinosaur-to-bird evolution. The two pterosaurs in the paper were dated at 165–160 Ma using evolutionary dates. This would suggest that any supposed common ancestry would have to be pushed even further back in evolutionary time to the Middle Triassic at the very least. Even then, this explanation would not explain why all these different types of ‘protofeathers/pycnofibres’ converge in one single pterosaur. Nor does it explain their similarities to the collagen fibres of marine carcasses in their partially decayed state.

As Alan Feduccia explained in *Riddle of the Feathered Dragons*:

“Given that Xu and colleagues suggested that

there is ‘a potential primary homology among the integumentary feathers’ of theropods such as *Beipiaosaurus*, the ornithischians *Psittacosaurus* and *Tianyulong*, and some pterosaurs, such a proposal would ‘push the origin of monofilamentous integumentary structures into the Middle Triassic at least’. As has been noted, some pterosaurs share filamentous structures indistinguishable from the dino-fuzz present on so many of the Early Cretaceous fossils, and most recently Zheng and colleagues have included still another ornithischian, the heterodontosaurid *Tianyulong*, to the list of dinosaurs and archosaurs associated with feather origins, ranging from herbivores and small meat-eating coelurosaurs to the large, flesh-eating tyrannosauroids.”¹⁷

Or,

3. The most likely conclusion: Admit that these are just collagen fibres. This is the most parsimonious explanation since this would explain why we also observe these filaments in creatures that do not have feathers (i.e. marine creatures). This option carries with it the burden of deleting the best evidence for feathered dinosaurs and poses a serious problem for the evolutionary dinosaur-to-bird paradigm.

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Flood processes into the late Cenozoic— part 7: critique of a post-Flood Cenozoic

Michael J. Oard

At the 2013 International Conference on Creationism, John Whitmore argued that post-Flood catastrophism was sufficiently widespread and intense to explain most of the Cenozoic. He posited that surficial sediments left by the Flood were commonly unlithified; that there was a lack of vegetation covering the ground, facilitating much greater erosion than seen today; that substantial meteorite impacts, volcanic eruptions, and huge tectonism occurred; that hypercanes and very heavy precipitation were significant; and that mass wasting occurred on a grand scale. However, these considerations fail to justify placing most of the Cenozoic into the post-Flood era. The difficult and controversial nature of geomorphology as a post-Flood boundary criterion, the carving of Grand Canyon, and the deposition of the Green River Formation also reveal reasons to be skeptical of such extensive post-Flood catastrophism.

Some creation scientists advocate that the Cenozoic, or most of it, is post-Flood. Some of the arguments for their position are presented in table 1 and have been analyzed elsewhere.^{1–3}

In this series of papers, I have examined 33 Cenozoic features that are much better explained by the Flood. Tim Clarey of ICR has also emphasized five widespread factors favouring a late Cenozoic Flood/post-Flood boundary.⁴ In contrast, John Whitmore of Cedarville University has presented evidence of how post-Flood catastrophes may be able to account for these Cenozoic features,⁵ building on his previous work.^{6,7}

Whitmore claims that mass wasting (sliding downslope) for a few hundred years after the Flood can account for most of the features of the Cenozoic. He claims mass wasting is aided by recently deposited and unlithified Flood sediments, with little vegetation, and a climate with heavy precipitation. The catastrophes can be giant volcanic eruptions, huge earthquakes, meteorite impacts, differential vertical tectonism, and hypercanes. He also contends that the potential to explain geomorphology by post-Flood processes has not been thoroughly explored.

Lithification of sediments

A key element in Whitmore's argument is that a large percentage of Flood-laid sediments would have been unlithified or only partially lithified right after the Flood. This allows him to suggest that these sediments, with their high pore-water content, could readily mass waste during post-Flood heavy precipitation events and catastrophes. Sapping would aid mass wasting and enlarge valleys. However, if the top Flood sediments were lithified, little mass wasting could occur.

To justify his belief of predominantly unlithified sediments, Whitmore writes:

“Some may argue that Flood sediments were already lithified at the end of the Flood and therefore this process may not have been important, but this argument is moot because some Flood sediments still remain poorly lithified today, more than 4,000 years later.”⁸

However, just because some sedimentary rocks are poorly lithified today, even in Paleozoic and Mesozoic strata, does not mean that most of the surficial layers were unlithified right after the Flood.

Indeed, it is unlikely that a significant proportion of the top layers of Flood sediments would be unlithified right after the Flood for several reasons, some of which are presented in table 2.⁹ First, late Flood vertical tectonism and Flood run-off would *scour predominantly unlithified sediments off the continents*, leaving behind older lithified strata, as we observe today.

Second, specific features of some conglomerates and breccia layers show that Flood run-off eroded not only unlithified sediments but also lithified sediments. For instance, abundant Paleozoic and Mesozoic limestone and sandstone boulders found in the Red Conglomerate Peaks along the Montana/Idaho border were solid when eroded or else they would have disintegrated (figure 1). These and other locations in south-west Montana represent about 2,000 m of erosional debris that was likely deposited east of the rising Idaho Batholith. The same argument can be made for Paleozoic and Mesozoic boulders in erosional remnants of a huge ‘fan’ of debris, once at least 3,000 m deep, spread east of the Beartooth Mountains (figure 2). The sandstone and limestone within the breccia must have been lithified or mostly lithified before the erosion that produced the breccia. One may argue that the limestone carries its own

Table 1. Six postulated evidences that the Flood/post-Flood boundary is at or near the K/T

1. Change from worldwide/continental to local/regional scale sedimentation
2. The Tertiary cooling trend
3. Tertiary mammals of the western United States
4. Tertiary bird and mammal tracks and the devils corkscrews
5. Tertiary volcanism in the north-west United States
6. The cooling of ocean basalt while the continents rise

**Figure 1.** Rounded and angular clasts form breccia of the Red Conglomerate Peaks on the Montana/Idaho border, USA. Most clasts are limestone with fossils, but some are sandstone. These clasts are eroded solid Flood rocks with the clasts in the breccia mostly dated as Paleozoic within the geological column (Brent Carter from Boise, Idaho, provides the scale).**Figure 2.** Erosional remnant of a 3,000-m-thick debris fan that accumulated on the east side of the Beartooth Mountains at Clarks Canyon, Wyoming, USA

cement. While true, some of the boulders are sandstone and need a lot of cement, implying great volumes of available fluid, to cement sandstone.¹⁰ Indeed, the material within this breccia was lithified and subsequently 99% of it eroded away. All this erosion occurred in the Cenozoic and is best explained by the Flood.

Third, vertical cliffs, such as the walls of 600-m-high Zion Canyon (figure 3), would bow out or be destroyed if the massive sandstone was not cemented at the end of the Flood. Most canyons and valleys of the world were eroded in the Cenozoic. In a post-Flood scenario, it would take considerable time to cement the Navajo Sandstone from which Zion Canyon was carved.

Fourth, planation surfaces and pediments, formed during Flood run-off, are bevelled on all types of rock, including sedimentary rocks. The rock must have been solid to form the flat surfaces, leaving behind a thin veneer of mostly rounded rocks.

Fifth, if thousands of metres of mass wasting occurred, depositing thousands of metres of sediments, then where are the thick unlithified sediments from these catastrophic events? Some of the mass wasted detritus should be nearby. It seems difficult that mass wasted debris would lithify after the Flood, or that any sediment for that matter, would significantly lithify in 4,500 years.

Lack of vegetation and diversification of grass

Whitmore believes that the early post-Flood period would be characterized by a lack of vegetation cover, especially grass, over large areas of the surface:

“Early in the post-Flood times significant vegetation was probably sparse. Erosion rates would have been significantly higher considering the increased precipitation rates and the other factors that have already been mentioned. Today, grasses are a significant agent in holding soils in place and preventing erosion. Bloom (1998) suggests that the evolution of grasses had a significant geomorphic impact,

not only for erosion rates on the continents, but depositional rates in the oceans (p. 51) Thus, there was probably a ‘badlands’ landscape in most areas following the Flood until grasses were able to widely diversify.”¹¹

In this view, therefore, heavy precipitation and mass wasting would more easily erode the surface into a rough badlands landscape.

However, there is evidence that the biosphere recovered rapidly after the Flood. First, the Bible indicates that the vegetation had started to sprout well before the animals left the Ark, since a dove brought back a fresh olive leaf. Second, God would not tell the animals to repopulate the world if the earth did not have enough food for them to live, and for the journey. Third, floating plant-debris mats would ground over large areas of the earth, which would likely have quickly produced vegetation.¹² Research at Mount St Helens showed a remarkable recovery of vegetation after only a few years.¹³

Meteorite impacts

Whitmore suggests that Cenozoic meteorite impacts would cause much post-Flood catastrophism.¹⁴ Indeed, they would, and there are 38 recognized impacts, some fairly large, during the Cenozoic.¹⁵ If there were three times as many impacts that are unrecorded because they hit the oceans, then there would be at least 150 post-Flood impacts. Would Cenozoic impacts, telescoped to within about 200 years after the Flood, be too devastating for the biosphere? They would at least cause a sustained impact winter.¹⁵

Post-Flood tectonism

Whitmore suggests a number of tectonic occurrences after the Flood, such as mountain uplift, possibly due to isostatic rebound, and more than a thousand kilometres of horizontal plate movement. However, the magnitude of this tectonism is stupendous and would result in huge magnitude earthquakes and coastal tsunamis. Cenozoic mountain uplift and basin and valley sinking totalled many thousands of metres.¹⁶ The elevation difference between granitic rocks at the bottom of basin fills in Wyoming and

Table 2. Five reasons why rocks immediately after the Flood would almost all be lithified

- | |
|--|
| 1. Flood run-off would scour unlithified sediments |
| 2. Conglomerate and breccia clasts lithified |
| 3. Vertical cliffs |
| 4. Planation surfaces and pediments cut on solid sedimentary rocks |
| 5. Problem of how mass-wasted debris would be lithified |



Figure 3. Zion Canyon in Zion National Park, Utah, USA

the tops of the mountains suggests that around 13,000 m of differential vertical tectonism occurred in Wyoming¹⁷ and 12,000 m in the Uinta Mountains.¹⁸ It is likely similar in other mountainous areas of the world. Can such huge vertical tectonism occur after the Flood? It would imply that there was very little relief on the continents immediately after the Flood, and so the people and animals that entered the new world from the Ark would have had to survive huge vertical and horizontal tectonism and tremendous mass wasting.

Because so many mammal fossils are found in the basins and Great Plains of the western United States in Cenozoic strata, differential vertical tectonism would have *had to wait* until the animals had spread across the earth and over the Bering Land Bridge, implying that the land bridge was somehow tectonically uplifted immediately after the Flood. Both the sheer magnitude and timing, relative to the dispersal and repopulation, of the vertical tectonism and the volume and characteristics of the Cenozoic sedimentary rocks point toward their being formed by a Flood mechanism and not post-Flood mass wasting.

Heavy precipitation and hypercanes

Whitmore and I agree there would be heavier precipitation immediately after the Flood caused by the warmer sea surface temperatures at mid and high latitudes. I performed a crude calculation on the amount of precipitation over the currently semi-arid south-west United States and estimated there could have been about four times the present precipitation right after the Flood.¹⁹ Probably the same average increase can be applied for the rest of the mid and high latitudes. However, as the oceans cooled after the Flood, the amount of precipitation would have tapered off within a few hundred years.²⁰ Heavier precipitation would have caused greater run-off and erosion, but such erosion would have been concentrated in river valleys. Increased precipitation after the Flood may be able to explain a few deep valleys, but how can it explain the hundreds to thousands of metres of erosion deduced for the vast areas between rivers, such as south of the Grand Staircase in Utah, USA?

Whitmore brings up rapid erosion on unconsolidated sediments and Quaternary megafloods during the Ice Age as examples of huge erosional processes.²¹ He mentions a location with one of the highest precipitations in the world, Mt Waialeale, Hawaii, that has carved out Waimea Canyon over a length of 16 km and a depth of 900 m. However, this erosion hardly resembles the vast volume of Cenozoic erosion that occurred.

Because the Ice Age occurred in the very late Cenozoic, Whitmore arbitrarily delays the Ice Age for a few hundred years after the Flood, to allow post-Flood catastrophism to run its course. This, however, has no meteorological basis. The oceans would have cooled off significantly in this period and so the amount of snow and ice available for the Ice Age would be significantly less than needed for ice sheets of significant thickness.²² At the end of the Flood, volcanic aerosols trapped in the stratosphere would cause an instant cooling over the mid and high latitude continents. Continued post-Flood volcanism would reinforce the continental cooling. The warmer ocean water would evaporate much more water vapour into the atmosphere at mid and high latitude than today. The result would initiate the Ice Age straight away in areas not close enough to be heated by the onshore flow of air from adjacent warm ocean water. These locations were the mountainous areas all over the world and interior and eastern Canada.

Whitmore especially emphasizes that hypercanes, hypothetical super hurricanes generated above warm oceans with water temperatures of 40°C or greater, were possible:

“Considering that the post-Flood oceans were probably very warm; it has been suggested that world precipitation rates were overall higher and that large storms and possibly hypercanes (super hurricanes with horizontal wind speeds greater than 300 mph) were

prominent in post-Flood times”²³

These would produce very heavy rain. However, if the tracks of hypercanes are similar to those of hurricanes, then hypercane erosion would be confined mainly to the east coasts of continents between about 40°N and 40°S. Furthermore, there is a problem generating large areas of hot ocean water at low latitudes for hypercanes. Worse still, hypercanes take time to develop, so the initial storm must intensify *slowly* over hot water (possibly generated by hot ocean bottom rocks?). So, both the atmosphere and water must almost be at *rest* to generate hypercanes.²⁴ This is unlikely after the Flood.

Earthquakes and volcanic activity

Whitmore mentions earthquakes and volcanic activity on a scale in the Cenozoic that enhanced post-Flood catastrophism. There is no doubt that the amount of Cenozoic volcanism was huge. Just the extreme tectonism (see earlier part) would cause monstrous earthquakes. But volcanism would result in volcanic winter, as discussed in part 6.¹⁵ It is doubtful that humans and large animals would survive in these conditions after God commanded them to repopulate the earth.

Mass wasting

Mass wasting is Whitmore’s main agent for erosion, transport, and deposition of sediments in post-Flood catastrophism. Landsliding is one form of mass wasting, but there are other types on the land, such as volcanic debris flows as observed at Mount St Helens in 1980 or the Heart Mountain slide during the Eocene.²⁵ Whitmore states:

“Certainly as continents were lifted out of the Flood waters, giant failures (exponentially larger than those we have historically observed) aided by water in sediments would have occurred, especially around the edges of the uplifted masses.”⁸

I believe he is correct on this conclusion, but the geologic activity likely occurred underwater at the end of the Flood and not above water after the Flood.

He gives other examples of relatively small landslides within historical times, claiming detachment faults, as described by Scott Rugg, are post-Flood, contrary to the Flood view of Rugg.²⁶ He mentions large slides of Hawaiian rocks into the ocean that have left large blocks of lava in the deep sea. In response to the possible question of why we do not see such large blocks on the land, he states:

“Probably one of the reasons that we can still recognize these great [Hawaiian] slides is that they are preserved underwater and have not had surficial processes at work to modify them. Recognition of these types of slides in terrestrial environments has been difficult in the past, and when catastrophic conclusions

are reached they are often very controversial (like the conclusions of Heart Mountain drawn by Pierce, 1987).”²⁷

He believes surficial processes would have destroyed these great blocks on land, although the blocks of the Heart Mountain slide have weathered little since their emplacement in the Eocene.

The net result of all this mountain uplift, mass wasting, and deposition of sediments is tremendous. For example, he asserts that the 10 km of uplift of the Teton Fault, along with 5,000 m of sediments accumulating in adjacent Jackson Hole, are post-Flood.²⁸ He could have mentioned other mountains and basins of Wyoming that show up to 13,000 m differential vertical relief, including several thousand metres of deposition in the basins. He also mentions the Salton trough of south-east California with 10 km of sediments. The top 5 km are dated as late Cenozoic,²⁹ which would mean these sedimentary rocks accumulated well after the Flood.

He says the net results of all this activity is:

“In short these processes should have either taken off hundreds to thousands of meters of sediment from that [end Flood] surface or buried that surface with hundreds to thousands of meters of sediments.”³⁰

Thus, he has come to the belief that all this erosion, deposition, and lithification of mass wasting debris as seen in the Cenozoic is expected! Such erosion would include the 2.5 to 5 km of average erosion of the Colorado Plateau, including the 4 to 5 km of erosion of the San Rafael Swell of the north-west Colorado Plateau.³¹ He goes on to say that my deductions have been off base: “Oard’s high placement of the Flood boundary (at the end of the Tertiary) essentially ignores the expected quantity of sediment that must have been produced during this time.”³² Instead of general statements, I would like to see specific examples of such mass wasting. He further states:

“Oard commonly uses examples like Devils Tower (eastern Wyoming on the edge of the Black Hills), Boars Tusk (southwestern Wyoming, between the Wind River and Uinta Mountains) and the area of the San Rafael Swell (southeastern edge of the Uinta Mountains and just west of the Wasatch Mountains, Utah) as examples of where incredible amounts of surface strata have been removed (2006a, 2009; Oard and Klevberg, 2008). Not surprisingly, all of these areas are high in elevation and are in areas where we might expect large



Figure 4. The top of the well-layered Eocene Wind River Formation in the upper Wind River Basin, Wyoming, USA. Note that a significant amount of erosion has occurred between the top of the strata and the viewer. According to the K/T Boundary Model, this formation was deposited hundreds of metres thick with hundreds of metres of erosion occurring at the top—all after the Flood.

amounts of erosion in post-Flood times.”³²

There are several problems with this analysis. The first is the sheer *magnitude* of the Cenozoic uplift, erosion, and deposition of thousands of metres of strata.³³

Second, after deposition of thousands of metres of sediments (e.g. in the Rocky Mountain basins) hundreds of metres of the top were eroded. How can a minimum of about 470 m of erosion occur over the entire Bighorn basin *after* the deposition of the Cenozoic sediments within the basin? What process does the eroding, long after the end of the Flood, since the basin fill must first accumulate? Moreover, the eroded sediments on the top of the Bighorn Basin, as well as other basins in the Rocky Mountains, are not found nearby, but have been swept off the continent. The Cenozoic strata just east of the Rocky Mountains are highly volcanic and not completely sedimentary, as would be expected in Whitmore’s scenario.

Third, the Cenozoic sediments need to consolidate—after the Flood. How could this happen, even for those sediments now on or at the surface?

Fourth, we should see evidence of mass wasting, but the Cenozoic sediments do not show the texture of massive mass wasting. They very often show water-deposited banding (figure 4).

Fifth, Whitmore needs to explain features left behind from all the erosion that can be seen on the surface of the earth, such as planation surfaces, water and wind gaps, pediments, long transported resistant rocks, deep vertically walled canyons, valleys, submarine canyons, etc.^{18,34} It is especially

the character of these features that show the difficulty of post-Flood catastrophism. How could all these form after the Flood? Uniformitarian scientists have the same problem. They attempt to solve geomorphological issues by throwing deep time at it. However, this does not work.¹⁸

Geomorphology

Whitmore does not believe geomorphology is all that significant in determining the Flood/post-Flood boundary. He states:

“In Oard’s model, retreating Flood water causes multiple features such as planation surfaces, water gaps and pediments; which are widespread in places like the western United States. However, these are surficial features that are *not buried*. If such features were produced by retreating Flood water, they should be either buried deep in basins or, if exposed, have been removed by post-Flood mass wasting according to the arguments presented here. Oard’s high placement of the post-Flood boundary utterly fails because it does not take into account the massive amount of erosion and deposition that would have happened *following* the draining of the Flood waters.”³⁵

However, he still needs to explain how these surficial geomorphological features formed *after* the Flood. These surficial landforms fit very well with the retreating Flood water.³⁶

I need to clarify the terminology that I have used for the Recessive Stage of the Flood, since Whitmore states:

“Although Oard often refers back to Walker’s paper as the origin of the terms ‘sheet flow phase’ and ‘channelized flow phase’ (e.g. 2012, p. 245) these words and concepts do not appear in Walker’s 1994 manuscript. The usage of these terms appear [*sic*] to have been first used by Oard (2001a, 2001b) as what might hypothetically happen when Flood waters retreated. No experimental or observational citations were made by him in those papers that documented that sheet flow leads to channelized flow; it was simply assumed.”³²

I simply renamed Walker’s two phases, the Abative and Dispersive Phases,³⁷ into more layman-friendly terms based on the advice of Ken Ham. The concepts of a sheet flow followed by channelized flow during the waning of any flood are sound. All floods transform from wide sheet flows into more channelized flows as more objects become exposed above the flood water.

Whitmore has stated that we have not examined geomorphology from a post-Flood point of view. I would think that such an analysis is up to him. Thus, he minimizes the powerful testimony of geomorphology:

“Thus, we need to be exceptionally careful when identifying geomorphic features caused by retreating

Flood water. Geomorphology should only be a minor consideration (rank of 3, Whitmore and Garner, 2008) when identifying where the Flood/post-Flood boundary may lie. Geomorphology should not be used exclusively or primarily as a criterion for the Flood/post-Flood boundary as Oard has advocated in many of his publications. Instead, multiple criteria should be sought in placing the boundary, realizing that some things may be more important than others (Whitmore and Garner, 2008). Not only would large amounts of post-Flood erosion be expected, but thick deposits of the eroded material would follow.”³⁸

It is not enough to challenge geomorphology or minimize it, but Whitmore needs to show how all these geomorphological features can occur after the Flood with lower energy and smaller scale events. Besides, I have always included other evidences besides geomorphology in my determining the Flood/post-Flood boundary. Indeed, I have explored many non-geomorphological factors in the late Cenozoic that are better explained by Flood processes than post-Flood catastrophism in this series of articles.

Whitmore suggests that thousands of water and wind gaps across mountains, ridges, and plateaus over the earth can possibly be explained by faults and joints: “In some cases these features might help explain how rivers cut through mountains and topographic highs, or have cut exceptionally deep canyons in short periods of time.”¹⁴ But water and wind gaps are hardly ever connected with faults, leaving the origin of water and wind gaps as a major problem for post-Flood catastrophism.

When it comes to pediments, Whitmore states that mass wasting deposits can sometimes be mistaken for pediments.³⁹ This is rare since pediments are *eroded* into hard rock, leaving a thin veneer of mostly rounded rocks, while mass wasting debris is depositional.

Grand Canyon

Since Grand Canyon was cut in the late Cenozoic by the receding floodwater,⁴⁰ advocates of the K/T Boundary Model automatically require a post-Flood mechanism. I believe this is the main reason for the dam-breach hypothesis, which has several flaws, two of which I believe are fatal.⁴¹ Whitmore and others think there is great potential in the outdated secular idea of the spillover hypothesis:

“Basin overflow hypotheses have been around for a long time to explain canyons like the Grand Canyon (Austin, 1994; Blackwelder, 1934). Although the erosion of the Grand Canyon is a complex topic and probably cannot be explained by a single model, basin overflow is being reconsidered by conventional geologists for both the upstream and downstream courses of the Colorado’s canyons (Young and Spamer, 2001).”⁴²

However, secular scientists have great difficulty explaining Grand Canyon,⁴³ and the spillover hypothesis has mostly been rejected.⁴⁴ The Bidahochi Formation, claimed to be leftover lake sediments, does not support a huge, ancient ‘Lake Hopi’. This formation is mostly volcanic and ‘fluvial’ with the lower portion said to be lacustrine. However, the types of sediments indicate a playa lake to uniformitarians, which is hardly what one expects for a large, deep lake. Besides the Bidahochi Formation is located only on the north-east *edge* of the supposed lake, while the whole Little Colorado River Valley should be full of lake bottom sediments, if the lake once existed, but there are none. Additionally, there are no erosional lake terraces around the claimed edges of these ‘lakes’, indicative of other Ice Age lakes like Lake Bonneville, the precursor to the Great Salt Lake, Utah.⁴⁵

The Green River Formation

The Eocene Green River Formation (GRF) plays a prominent part in the post-Flood catastrophism hypothesis. The GRF does have unique features that are difficult to explain in either a Flood or post-Flood model. However, the GRF must *first* be put into biblical history with all the clues available before we attempt to explain how various rocks and fossils fit. As Thomas Kuhn states with interpretations, it is always possible to reinterpret the data within a different paradigm:

“Philosophers of science have repeatedly demonstrated that more than one theoretical construction can always be placed upon a given collection of data. ... One perceptive historian, viewing a classic case of a science’s reorientation by paradigm change, recently described it as ‘picking up the other end of the stick,’ a process that involves ‘handling the same bundle of data as before, but placing them in a new system of relations with one another by giving them a different framework.’”⁴⁶

There are many strong evidences that the Green River Formation was deposited during the Flood,^{33,47} some of which are presented in table 3.

Discussion

The evidence is abundant that the Cenozoic is predominantly from the Flood. I think most of the difference of opinion can be explained by the old adage of the six blind men and the elephant (figure 5). Many have drawn different conclusions from different backgrounds and training.

Table 3. Five evidences that the Green River Formation is best explained as a Flood deposit

1. Covers 77,000 km ²
2. Averages 600 m thick, but includes 6,800 m thick adjacent to southern Uinta Mountains
3. About 5,000 m of erosion of the San Rafael Swell of which the top formation is the GRF
4. Enough oil in the shale for 100 years of US energy needs
5. Tropical and subtropical fossils at inland location that is currently near the continental divide

Most advocates for attributing the Cenozoic to post-Flood catastrophism are creation paleontologists. On the other hand, I have included evidence from many fields that relate, including geomorphology, sedimentology, and paleontology.

I can’t help but think that another reason why some creationists place the boundary at the K/T, or even lower in the geological column, is because they cannot imagine how certain features in the rocks and fossils could have occurred during the Flood that we have never been witness to. Others are possibly hampered by their secular geologic training and some may be unwilling to weigh and critically access the strength of each type of data.

Second, we need to admit that just because we cannot find a Flood mechanism for ‘such and such’, does not mean ‘such and such’ is not a product of the Flood. We may not have all the facts. We certainly do not understand a global flood that well. And we certainly are not smart enough to integrate and remember almost an infinite amount of data to determine the placement of a phenomenon. We also should not expect to answer every question or challenge this side of eternity.

One thing is for sure, once the proper placement of a location or phenomenon within biblical earth history is first established, we will all be able to do better research. And with time, answers to many phenomena will be revealed.



Figure 5. The blind men and the elephant (wall relief in north-east Thailand) (Pawyi Lee, Wikipedia Commons PD-self)

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The green algae *Chlamydomonas reinhardtii* find safety in numbers by design

Matthew Cserhati

The development of multicellularity is one of the most significant steps during the purported evolutionary history of life. Multicellularity would theoretically allow for the further differentiation of cell types. This would allow for greater variability and facilitate evolutionary change. A study has been performed on the green algae *Chlamydomonas reinhardtii* that demonstrated a rapid transition from a unicellular to a para-multicellular phenotype due to predatory pressure. It can be demonstrated that evolution has nothing to do with this kind of transition. Rather, a pre-existing genetic mechanism had already been in place to adapt the algae to environmental cues, such as predation. The normally unicellular *Chlamydomonas reinhardtii* as well as the obligately multicellular *Volvox carteri* are both members of the same baramin. A preliminary analysis indicates that a genetic basis exists for the transition between unicellularity and multicellularity within this baramin.

One of the most critical steps during evolutionary history was the supposed transition from unicellular to multicellular life forms. Both unicellular and multicellular forms have been observed in algal species such as *Chlamydomonas reinhardtii* and *Chlorella vulgaris*. Because of this, these and related species have been the focus of intense evolutionary experimentation. Some evolutionists theorize that a transition to multicellularity was driven by predation. Most predators can consume prey only within a certain size range, and prey species larger than a given threshold are immune to such predation.

However, there is no fossil evidence that this transition happened. The earliest multicellular life forms are already fully formed. There is no nascent multicellular stage evident in the rocks. Evolutionists admit that surprisingly little is known about the origin of multicellularity,¹ hence the interest in a unicellular algal species that demonstrates the ability to suddenly produce clumps of cells. This has given some evolutionists confidence, but a true transition to multicellularity would necessitate the evolution of a multitude of new genes, including ones that code for proteins involved in an extracellular matrix (ECM), cell-to-cell communication, cellular differentiation and specialization, and cellular cohesion, not to mention genes which alter the reproductive cycle.

But could it be that, instead of evolving multicellularity, algal species find safety in numbers *by design*?

Predation tests with *C. reinhardtii* strains

Herron *et al.*¹ used ciliate predator species *Paramecium tetraurelia* to select for populations of *C. reinhardtii* which seemed to have evolved multicellularity. In their experiments, the *C. reinhardtii* populations were cultured for 50 weeks,

representing about 750 generations. The strains were put into 24-well tissue culture plates and were observed with time-lapse videos. The resulting strains were classified based on the sizes of the parent and propagule clusters.

They began the experiment with a mother culture derived from crossing two different algal strains obtained from the Chlamydomonas Resource Center. They divided this initial culture into five experimental (B1–B5) and three control (K1–K3) ‘populations’. Within each population were multiple ‘strains’, each apparently grown in a separate well of a 24-well culture plate. A ‘strain’ is equal to all genetically identical descendants of an individual haploid cell isolated from a given population (i.e. B2-01 denotes strain #1 from population B2).

Yet, they do not describe their culture protocol in depth. For instance, how many replicates did they culture? Did they avoid pseudoreplication by culturing all eight populations, in triplicate, and in random positions, on each plate or did they fill each of the 24 wells with cells from the same population? They also say: “During transfers, populations were homogenized with a multichannel pipette ...”. This means that all subcultures of each population were pooled, but this makes no sense. Why would they use a multichannel pipette, for instance, if they were pooling each subsample of each population? We can only assume that they mixed their samples randomly. The worst thing they could have done would be to create eight 24-well plates, with one population per plate, and then stack them in order in the incubator. This would give them an ‘n’ of 1 per population (because all 24 wells on each plate would be causally connected) and would introduce the possibility of uncontrolled variables like light or temperature differences across the stack. We can only assume they were aware of such things. However, it is impossible

Table 1. Characterization of different categories of strains of *C. reinhardtii* in the Herron *et al.* experiment

	A	B	C	D
Strains	K1-01, K1-06, B2-10, B5-06	B2-01	B5-05	B2-03, B2-04, B2-11
Predator present	X	✓	✓	✓
Multicellular	✓	✓	✓	✓
Extracellular matrix	X	✓	✓	✓
Multicellular propagules	X	X	✓	✓

to reproduce their experiment given the description in their Methods section.

Para-multicellular structures appeared in two of the five predator-selected populations and one of the control populations. Seven strains were selected from the experimental populations (B2-01, B2-03, B2-04, B2-10, B2-11, B5-05, and B5-06) and two strains were selected from the control population (K1-01 and K1-06). They did not explain why they used five from the B2 population, but only two from the B5 and K1 populations. These nine strains were put into four different categories (A–D) based on a variety of lifestyle characteristics, such as the presence of unicellular to various multicellular forms, or the number and kind of propagules (daughter cells/cell clusters) that were released from the cell clusters, etc. These four categories are described in table 1. Figure 1 depicts samples from supplementary video 3 and 8 of Herron *et al.* showing cells in unicellular (figure 1A), and multicellular form (figure 1B).

The strains from categories B, C, and D, also formed an extracellular matrix (ECM). As cells grew and divided, some stayed embedded in the ECM, whereas sometimes the colony released propagules (either individual cells or groups of cells which broke away from the main colony). Category C was similar to category B, but with larger-sized colonies. As opposed to categories B and C, which released only

single-celled propagules, category D released multicellular propagules.

Certain considerations strongly suggest that the unicellular algae such as *C. reinhardtii* and several multicellular algal species belong to the same created kind, or baramin. A baramin is a group of species which show continuity with one another and discontinuity with all other species. Member species generally form a reproductive continuum with one another. For example, Prochnik *et al.*² have sequenced the genomes of both *C. reinhardtii* and *Volvox carteri*. They found that the overall genome size, the number of protein-coding genes, the number of different kinds of protein domains, and the distribution of gene family sizes are both very much the same.³ Hence, these two cellular forms are likely only phenotypically different expressions of the same baranome (the ‘baranome’ being the initial, created genome from which the genomes of all other species within this ‘kind’ derive).

Materials and methods

The Gene Content Method (GCM)⁴ analyzes the whole proteomes of the species under study and cross-compares them with one another. The species included in the current analysis include *C. reinhardtii*, *Chlamydomonas eustigmata*, *Chlorella sorokiniana*, *Chlorella variabilis*, *V. carteri*, *Micromonas commoda*, and *Micromonas pusilla*. *Saccharomyces cerevisiae* was used as an outgroup. The species, their Uniprot ID, the number of proteins in their proteome, and the number of mapped proteins can be seen in table 2. For each species, each protein is assigned to an orthology group (if possible) by the OrthoMCL algorithm.⁵ A pairwise overlapping percentage is then calculated for each pair of

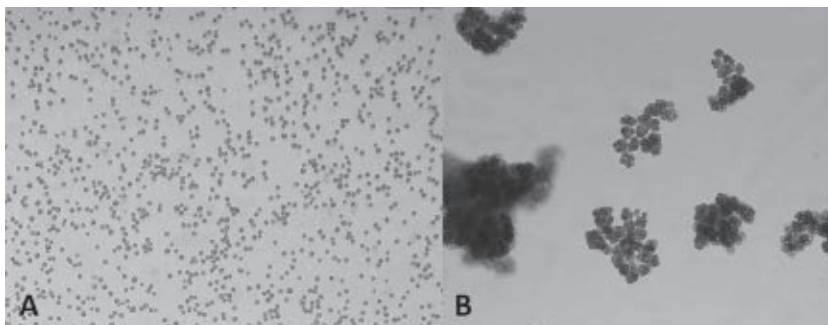


Figure 1. Video snapshots from supplemental video picture from the Herron *et al.* study showing A. unicellular, and B. multicellular forms of *Chlamydomonas reinhardtii*

Table 2. Proteome characteristics of the nine species used in this analysis

Species	Uniprot ID	no. proteins	no. mapped proteins
<i>Chlorella sorokiniana</i>	UP000239899	10201	4746
<i>Chlorella variabilis</i>	UP000008141	9831	5050
<i>Chlamydomonas eustigmata</i>	UP000232323	14139	6243
<i>Chlamydomonas reinhardtii</i>	UP000006906	18828	7926
<i>Gonium pectorale</i>	UP000075714	16224	6815
<i>Micromonas commoda</i>	UP000002009	10115	6893
<i>Micromonas pusilla</i>	UP000001876	10250	5786
<i>Saccharomyces cerevisiae</i> (outlier)	UP000002311	6049	4537
<i>Volvox carteri f. nagariensis</i>	UP000001058	14335	8181

species. Clusters of species are calculated using the k-means algorithm and are visualized on a heat map.

The algal and yeast proteomes were downloaded from the Uniprot Database at uniprot.org. The OrthoMCL pipeline for each proteome was run at the EuPathDB Galaxy website at eupathdb.globusgenomics.org to map the proteins to OrthoMCL groups. Jaccard Coefficient Values were calculated according to the GCM method. R (version 3.5.2) was used to create the heat map between the five algae species using the heat map.2 function. Supplementary File 1 is available at github.com/jeanomicks/multicellularity.

Results from the baraminological status of *C. reinhardtii*

The GCM software was run by the author to fit three baramins (figure 2). Indeed, the two *Chlamydomonas* species cluster together with *V. carteri* as well as *Gonia pectorale* (a volvocine alga of 8–32 cells) to form a statistically significant single baramin (the ‘Volvox’ baramin). This baramin has a mean Jaccard Coefficient Value (JCV) of 0.648 and a range of 0.572 to 0.722. JCV is defined as the overlap of common genes divided by the union of such genes,⁶ with higher numbers representing more significant similarities between species. For perspective, the JCVs between this group and all other species is 0.188 to 0.527 ($p = 1.24 \times 10^{-4}$, Student’s t-test between JCV values between species within the *Volvox* kind versus JCV values between *Volvox* and all other species).

The two *Micromonas* species also cluster together to form a statistically significant putative baramin ($p = 2.3 \times 10^{-9}$), with a JCV of 0.750, which is the highest JCV between any two pairs of species in the study. The two *Chlorella* species have a JCV of 0.697 ($p = 2.1 \times 10^{-8}$) (table 3). The JCV matrix can be seen in table 4. Figure 3 depicts JCV values within a given baramin, between a given baramin and all other species, and between members of a given baramin and the outlier species. It is easy to see that the within-baramin JCV

values separate well from the among-baramin JCV values and the outlier JCV values.

Discussion

Herron *et al.* speculate that multicellular phenotypes have a genetic basis involving the co-option of a previously existing plastic response.¹ Therefore, the shift from a unicellular to a multicellular lifestyle may involve a shift to the expression of genes involved in multicellular life forms. This means that the genetic machinery responsible for multicellular life is already in existence. No explanation of any kind was offered to how these genes themselves supposedly came into existence via evolution. Thus, the only thing that happened was a phenotypic change due to differential expression of genes specific to a sort of pseudo-multicellularity. We do not yet know what genes were involved.

In fact, the time frame that was made available for the *Chlamydomonas* strains to evolve new multicellularity-specific structures was only 750 generations. This happened despite claims by evolutionists that the gene content of *C. reinhardtii* and *V. carteri* have stayed the same for ~310 million years.² Since the transition happened in parallel in multiple cultures, it happened much too rapidly for any kind of genetic mutation to cause the differences in phenotype. Rather, this supports the idea that multicellularity-specific genes serve as design elements which are differentially expressed according to different external conditions (e.g. the absence or presence of predators), helping the algae to adapt to such conditions. Yet, the fact that the transition occurred in one of the control populations indicates that we have a lot more to learn about the environmental triggers that control the life history strategies within *C. reinhardtii*.

In a related experiment, Herron *et al.* studied transcription in a unicellular strain of *C. reinhardtii* and a multicellular strain over a characteristic life cycle spanning 72 hours.

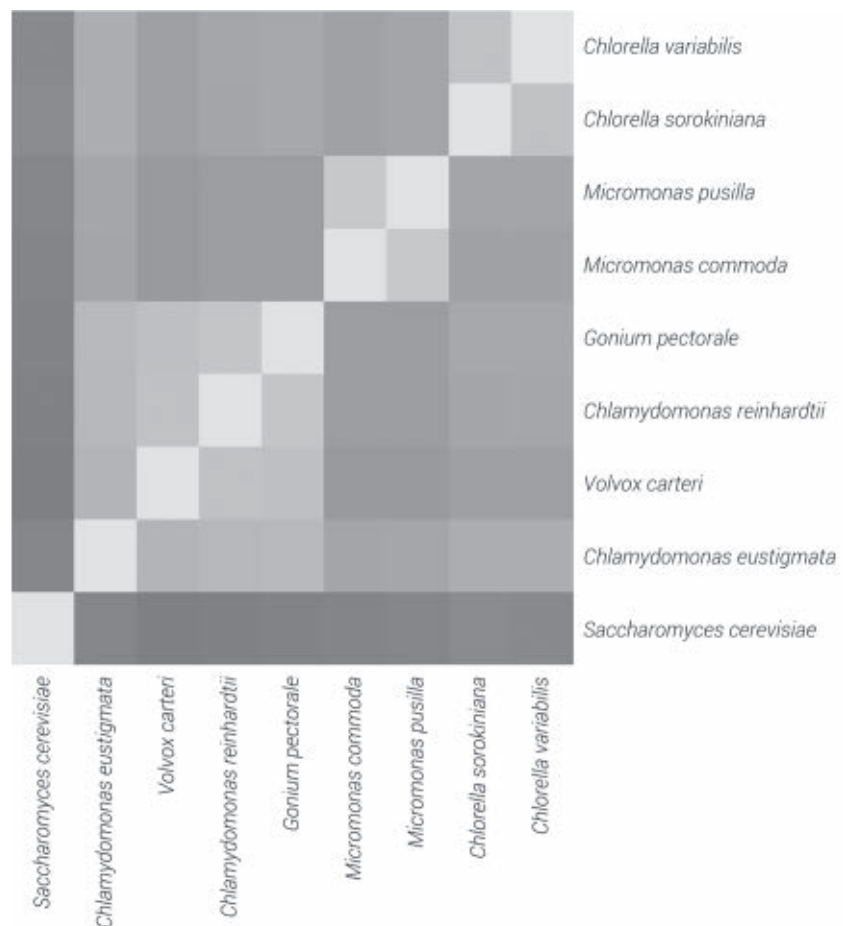
Table 3. JCV statistics for the three putative baramins analyzed in this study

Baramin	No. species	Min JCV	Max JCV	St.dev.	p-value
Volvox	4	0.572	0.722	0.058	1.24×10^{-4}
Chlorella	2	0.697	0.697	NA	2.1×10^{-8}
Micromonas	2	0.75	0.75	NA	2.3×10^{-9}

Approximately 20% (3,453) of all *C. reinhardtii* genes were found to be differentially expressed by fourfold or greater in at least one time point. The ontology of the over-represented genes is related to cell cycle and reproductive processes.⁷

Brueggeman *et al.* showed that roughly 32% of all *C. reinhardtii* genes were significantly differentially expressed (> 1 absolute \log_2 -fold change) when transitioning from high to very low (≤ 100 ppm) levels of CO_2 .⁸ These genes were part of a CO_2 -concentrating mechanism which accumulates the CO_2 necessary for photosynthesis. Thus, we know that the species already contains an elaborate system that controls a massive metabolic change. It only makes sense that the phenotypic changes they report also involve predetermined pathways. This is evidenced by the fact that it arose independently in multiple cultures and in a very short space of time. In fact, since the predator and the prey would be expected to interact naturally and frequently in the wild, one might expect that what was discovered is only a pre-engineered system to regulate the populations of both. Phenotypic switches are caused by the interplay between hundreds of genes. For example, in yeast, the cytotoxin CuO induces the differential expression of some 654 genes, shifting metabolism from alcoholic fermentation to aerobic respiration.⁹

A facultative multicellular phenotype is not rare and occurs not just in algae but also in bacteria and yeasts, such as *Saccharomyces cerevisiae*.¹⁰ Herron and co-workers have documented it in at least 25 separate lineages across all life forms.¹¹ The supposed evolution of multicellularity is thus all the more unlikely, since it must have evolved more than once, according to the principle that evolutionary trajectories do not repeat themselves.¹² The freshwater bacterial strain *Flectobacillus* displays both a filamentous phenotype when in

**Figure 2.** JCV heat map of the nine species under study showing differences between the Volvox, Chlorella, and Micromonas baramins

the presence of protist predators, as well as a rod-like shape during carbon deprivation (low CO_2 concentrations). Similar rapid phenotypic changes by some bacterial species is based on the adaptation of underlying genetic mechanisms.¹³

It may be possible to expand the *Volvox* baramin to include species from the genus *Vitreochlamys*, as well as the colonial volvocine groups *Tetrabaena*, *Goniaceae*, and other species from *Volvocaceae*, the latter three of which have been shown to be monophyletic by a number of studies.^{14,15} It is also possible that the unicellular algae are derived from multicellular forms. This implies devolution and not evolution, which is a much easier process to explain,¹⁶

Table 4. JCV matrix for nine species under study

	<i>Chlamydomonas eustigmata</i>	<i>Chlamydomonas reinhardtii</i>	<i>Chlorella sorokiniana</i>	<i>Chlorella variabilis</i>	<i>Gonium pectorale</i>	<i>Micromonas commoda</i>	<i>Micromonas pusilla</i>	<i>Saccharomyces cerevisiae</i>	<i>Volvox carteri</i>
<i>Chlamydomonas eustigmata</i>	1	0.187821052	0.365031274	0.368870323	0.672354188	0.419787531	0.413095759	0.697975965	0.571926765
<i>Chlamydomonas reinhardtii</i>	0.187821052	1	0.225572836	0.215569499	0.201396973	0.246846144	0.253104752	0.195721002	0.228910169
<i>Chlorella sorokiniana</i>	0.365031274	0.225572836	1	0.750034507	0.396077997	0.452741654	0.454093608	0.39562341	0.461248785
<i>Chlorella variabilis</i>	0.368870323	0.215569499	0.750034507	1	0.391392611	0.427052217	0.420776367	0.398810648	0.451010715
<i>Gonium pectorale</i>	0.672354188	0.201396973	0.396077997	0.391392611	1	0.471901749	0.470116989	0.722079439	0.616689365
<i>Micromonas commoda</i>	0.419787531	0.246846144	0.452741654	0.427052217	0.471901749	1	0.696570835	0.468039371	0.526081081
<i>Micromonas pusilla</i>	0.413095759	0.253104752	0.454093608	0.420776367	0.470116989	0.696570835	1	0.454545455	0.526886203
<i>Saccharomyces cerevisiae</i>	0.697975965	0.195721002	0.39562341	0.398810648	0.722079439	0.468039371	0.454545455	1	0.609564921
<i>Volvox carteri</i>	0.571926765	0.228910169	0.461248785	0.451010715	0.616689365	0.526081081	0.526886203	0.609564921	1

like how parasitic bacteria devolved from wild species through genomic reduction.¹⁷

Even though the genomes of *C. reinhardtii* and *Volvox carteri* are almost identical, there are some genes which are active in the *Volvox* developmental processes which are not active in the developmental pathway of *Chlamydomonas*, although the *Chlamydomonas* gene versions can rescue *Volvox* mutants. An example of such a gene is *glsA*, which is responsible for asymmetric division leading to colony inversion.¹⁸ Furthermore, two gene families which are responsible for the production of the ECM have more members in *Volvox* than in *Chlamydomonas*.⁵

According to basic evolutionary theory, when species reach a new level of complexity, the new species is greater than the sum of the previous levels. Each new level of complexity is built upon, but cannot be explained merely in terms of the previous levels alone. These experiments do not prove evolution, which requires the augmentation of a prior genetic system to fit a new need. This would involve the great quantity of new information necessary to coordinate newly founded relationships between individual cells. New genes with entirely new functions would be necessary to coordinate individual cells with each other in a multicellular system.¹⁹ This did not happen here with *Chlamydomonas* and *Volvox*. *Chlamydomonas* cells indeed form an ECM, but afterwards individual cells, or clumps of cells, break off after reaching a pseudo-multicellular state. But could this be considered an incipient, transitional stage on the way to multicellularity? The genes for ECM formation are present in both *Chlamydomonas* and *Volvox*, showing that no genetic changes accompanied this phenotypic change between the two species. Herron *et al.* claim that *C. reinhardtii* has no multicellular ancestors, and that they discovered a completely new origin of obligate multicellularity. Yet

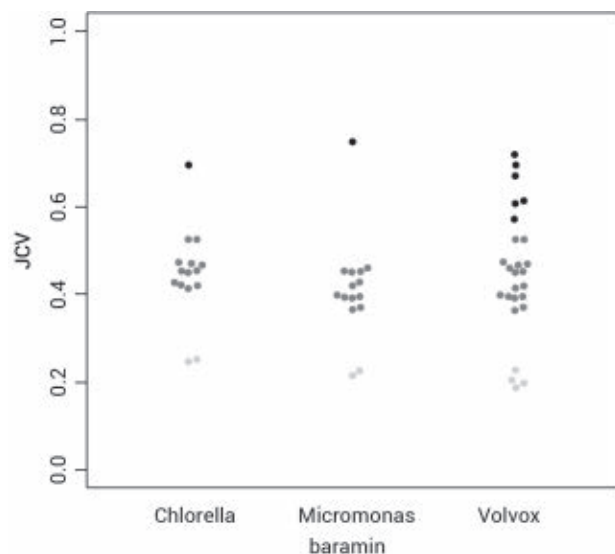


Figure 3. Beeswarm plot of JCV values between members of a baramin (black), between members of a baramin and all other species (dark grey), as well as between members of a baramin and *S. cerevisiae* as an outlier (light grey). JCV values depicted for the *Chlorella*, *Micromonas* and *Volvox* baramins.

it might be the other way around, namely that unicellular algae are descended from multicellular forms, with a diminished capacity of forming an ECM.

Summary and conclusion

With this experiment, evolutionists have shown absolutely no evidence for evolution. Neither have they shown the transition of unicellular life to multicellular life. Rather they have uncovered what appears to be a pre-existing, complex, designed genetic system that is, perhaps, responsible for phenotypic adaptation against predators. In fact, there is some evidence that the unicellular volvocine algae are actually derived from multicellular forms via devolution, and not evolution. Furthermore, three preliminary algal holobaramins were predicted, that of the genera *Chlorella*, *Micromonas*, and *Volvox/Chlamydomonas*. The *Volvox* baramin displays a dual unicellular/multicellular phenotype.

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A history of the United Methodist Church's opposition to creationism and intelligent design

Jerry Bergman

The United Methodist Church's opposition to both creationism and intelligent design was reviewed. It was concluded that the membership is generally in support of the creation worldview, but the high-level leadership, especially the bishops, in general, support the Darwinian worldview and oppose the creation worldview. According to its website, the church's official policy is that all life, including humans, evolved from a common ancestor by the accumulation of mutations selected by the survival-of-the-fittest mechanism called natural selection.

For much of the last century, the United Methodist Church (UMC) leadership has played an important role in the pro-Darwinian, anti-creation/intelligent design movements. The United Methodist Church was formed in 1968 as a result of a merger of the Methodist Church and the Evangelical United Brethren Church. The 1800s Methodist Church split over slavery is not covered here except to note the split was not only their view of slavery, but also creationism and other topics.¹ The UMC organisation is episcopal, consequently bishop leadership plays a crucial role in all major church policies. Some leading Methodists accepted Darwinism very early, and “within a decade of the publication of Darwin’s *On the Origin of Species* they had found a way to reconcile evolution with the Gospel”.²

Thomas Yorty, in a review of academic Methodist thought, wrote that “use of the argument from design abounds in the [UMC’s] *Review*. Significantly, however, the [design] argument after 1877 seems to be used as a way to accommodate or modify Darwin’s ideas.”³ Yorty concludes that after 1877 the accommodationists’ view, often articulated as theistic evolution, or where God used evolution to create life, often dominated Methodist academic thought. The role of God in theistic evolution is often fuzzy or even undefined, but this view is often pure Darwinism with a thin veneer of theism. Church historian Robert Chiles wrote after the civil war, “Methodism gave more and more attention to the challenge of science, particularly as expressed by Darwin and the evolutionists. Methodism’s response [then] varied from outraged rejection to cautious acceptance.”⁴ The most detailed study of the creation issue in the UMC also confirms this.⁵ Chiles added: “Darwinism could not be ignored or rejected indefinitely and gradually was accepted by making God the dynamic power immanent in man and the universe.”⁶

Chiles concluded that the most influential Methodist theologians, including William Warren, argued for the

“restatement of the evangelical doctrine of sin in terms compatible with scientific and philosophical tenets. [Leading UMC theologians] Bowne, Knudson, and others accepted many of the implications of Darwinism which led to belief in man’s ascent [evolution from apes] but not his fall.”⁷ Of course, rejecting the Genesis Fall negates Christ’s sacrifice, and thus guts the core of Christianity. Thus, Darwin’s goal to murder God succeeded by replacing God with another creator, namely natural selection and survival-of-the-fittest, with the less fit perishing.

Professor Dawn Digrius, in a review of how theistic evolution became established in Protestant churches, and specifically the UMC, observed that Rev. Lyman Abbott’s mission was to persuade Americans that “science and faith were compatible and ... as he and John Fisk believed, ‘Evolution was God’s way of doing things’ and ... there had never been any conflict between science and religion, nor was there any need for reconciliation, because harmony had always existed.”⁸ As an advocate of evolution, Congregationalist Lyman Abbott (1835–1922) naively assumed the scientific evidence supported Darwinism and focused on accommodation of evolution with Protestantism. Church historian William Warren Sweet wrote Abbott was so important that “no religious leader in the modern period has exercised a more abiding influence” on American Protestantism, including on the Methodist Church.⁹

Digrius then traces the influence of Fisk and Abbott to Methodist minister Lynn Harold Hough (1877–1971), who supported the accommodationists’ view, and taught that Christianity could assimilate evolutionary concepts without compromise. As a dean at Methodist Drew Theological Seminary, where he had been a professor since 1930, and dean since 1934 until he retired in 1947, he was involved in training thousands of ministers and other church leaders.¹⁰ Typical of the accommodationists’ view was Robert William

Rogers (1864–1930). As Professor of Hebrew and Old Testament Exegesis at Drew, he reconciled Genesis and geology by stratagems such as the “acceptance that six days equals six eons, and that the Bible was a book of religion, not science”.¹¹

The Hough Phelps affair

As a result of the support by Abbott, Hough, and other Darwinists, “by the 1920s evolutionary theory had been generally accepted by liberal American theologians, who ‘adapted their theological positions to it.’”¹² The fundamentalist movement challenged the general acceptance of Darwinism which Hough, in turn, challenged by defending evolution. Hough was known to be a man of unusual insight, winning him distinction for his many pursuits, scholarly and theological.¹³ Hough was listed as one of “the twenty-five most influential preachers in America” by a vote of 25,000 Protestant clergymen.¹⁴ Hough’s seminary training and his “exposure to liberal theology and modernism had left him open to accept the validity of Darwinian evolutionary theory”.¹⁵

About this time, William H. Phelps, editor of *The Michigan Christian Advocate*, wrote that the conviction of John T. Scopes in Dayton, Tennessee, produced “careful thinking on the part of every one of us”. He concluded Methodists should “begin to use evolution a bit instead of abusing the scientists!” and to “welcome every hand, scientific or theological, that offers to help us enthrone Christ”.¹⁶

As a result of this statement by Phelps, on Monday, 31 August 1925, formal charges were brought against Hough and William H. Phelps by Rev. Bird led by Dr E.J. Warren of the Detroit Conference. Consequently, the Methodist Episcopal Church was forced to respond to the heresy charges. Congregants who agreed with the views of Hough recalled the enthusiasm with which his sermon was received locally. Although the committee was reticent to have the press present at the meeting, Bird demanded media coverage, and the committee reluctantly agreed. Bird declared he opposed the “encroachments of the evolutionary theory upon religion” and believed that “the doctrine of evolution was going to split the church in two”.¹⁷

The UMC committee met and recommended the Detroit Conference refuse to even consider Bird’s charges. When the UMC conference received the report, they responded with “loud and prolonged cheering”.¹⁸ Widespread coverage of the heresy proceedings strongly supported Hough over Bird. This event was important in solidifying

the Darwinists’ position in the UMC. Digrius asserted that those persons like Hough wish to deflate the conflict, a goal that includes groups such as *The Clergy Letter Project*. Their goal is to bring clergy and scientists together in an effort to convince them that “numerous clergy from most denominations have tremendous respect for evolutionary theory and have embraced it as a core component of human knowledge, fully harmonious with religious faith”.¹⁹ In fact, the project’s goal actually silences Darwin critics in the church.

The acceptance of evolution by leaders of the Methodist Church was by no means unanimous. Among those who rejected the Darwinian worldview were L.W. Munhall and Charles Roads, editor and associate editor respectively, of the *Eastern Methodist*. They wrote: “As to evolution ... it is but a hypothesis, un-sensible, unscientific, and unscriptural.”²⁰

The situation today

An example of one who supported Darwinism is Methodist Bishop, Rev. Kenneth Hicks; he supported Darwinian evolution *against* efforts to rectify the all-too-common indoctrination of this view in public schools, at the famous Arkansas trial.²¹ The judge, Methodist layman William R. Overton, acknowledged in his decision, dated 5 January 1982, that those who opposed the law (designed to protect teachers who conclude the science evidence against the view that ultimately genetic mutations are our Creator), included the UMC Arkansas Bishop as well as the Bishop of the African Methodist Episcopal Church.²²

When the 1986 Louisiana Darwinism anti-indoctrination case designed to protect teachers’ right to objectively present the evidence for and against evolution in the classroom was before the Supreme Court, several UMC bishops filed a brief *against* this bill. Specific Methodists involved included Bishop Kenneth Williams Hicks of the Arkansas UMC Conference and Bishop Frederick C. James of the African Methodist Episcopal Church of Arkansas.²³ The editor of



Figure 1. John Wesley (1703–1721), founder of the Methodist denomination

Image: Wellcome Images/CC BY 4.0

the journal *Church and State* concluded that the support of 12 clergymen, including the Methodist bishops, was critical in the judge's ruling that resulted in the termination of the careers of many creationists.²⁴

Other Methodists involved in supporting Darwinism include Rev. Earl B. Carter, minister of the United Methodist Church and program director of the North Arkansas UMC Conference; the Rev. George Panter, a UMC minister and program director of the Little Rock Conference of the United Methodist church; and Dr John P. Miles, minister of St. James UMC in Little Rock, Arkansas. Miles was also vice-chair of the aggressively anti-creationism/anti-intelligent design *Americans United for Separation of Church and State* in Arkansas.²⁵

Americans United have a long record of opposing those who argue against mandated Darwinism indoctrination in public schools. The senate bill they opposed was framed to help prevent Darwinian indoctrination and prohibit the common problem of discrimination against creationist teachers and professors.²⁶ Conversely, the Free Methodist Church of North America, which split from the Methodist church over the issue of slavery, argued *against* the Darwinian worldview.²⁷

The major published histories of both the original Methodist Church and the United Methodist Church, including those that cover doctrine, are largely silent on this issue. Even the word evolution is generally not used except to describe changes in church policies, and the word creation is used as a general term for the natural world, usually in connection with environmental issues.²⁸ One historian mentioned only that after the civil war there existed some "virulent opposition to theories of evolution" in the Methodist Church.²⁹ Hymns written by Wesley (figure 1), the founder of Methodism, touched "on every important biblical teaching [including] creation" referring not to creationism but to the beauty in the natural world.³⁰

The official position is Darwinism

The official position of the UMC since at least 2008 is very clear: theistic evolution, which translates into evolution with a thin coat of theism.

"United Methodist General Conference passed three petitions that accept the theory of evolution. One opposes the introduction of any faith-based theories such as creationism or intelligent design into public-school science curricula. The addition made to 160 F of the Social Principles states in part: '... science's descriptions of cosmological, geological, and biological evolution are not in conflict with theology.' The Book of Resolutions 2008 [figure 2] includes two resolutions that address the topic: #1027, 'God's Creation and the Church,' and #5052, 'Evolution and Intelligent Design'."³²

Another example officially supporting evolution is in answer to a question published on the official church website: "What is the UMC's position on evolution?" The answer was: "the official statement is, 'We find that science's descriptions of cosmological, geological, and biological evolution are not in conflict with theology.'"³¹ Under the subtitle "It's time for people of faith to accept evolution," we read that the UMC needs

"... to overcome its qualms about evolution for the sake of our children, each other and the future of society ... in accepting the findings of science. Together we need to correct the misconceptions and discard the myths. Eugenie C. Scott, the executive director of the [aggressively anti-creationist] National Center for Science Education, says that rejecting evolution puts at risk the high level of scientific achievement that has helped propel the United States to a position of economic, technological and political leadership. ... Delegates to The United Methodist Church's 2008 General Conference overwhelmingly passed three petitions clarifying the denominational

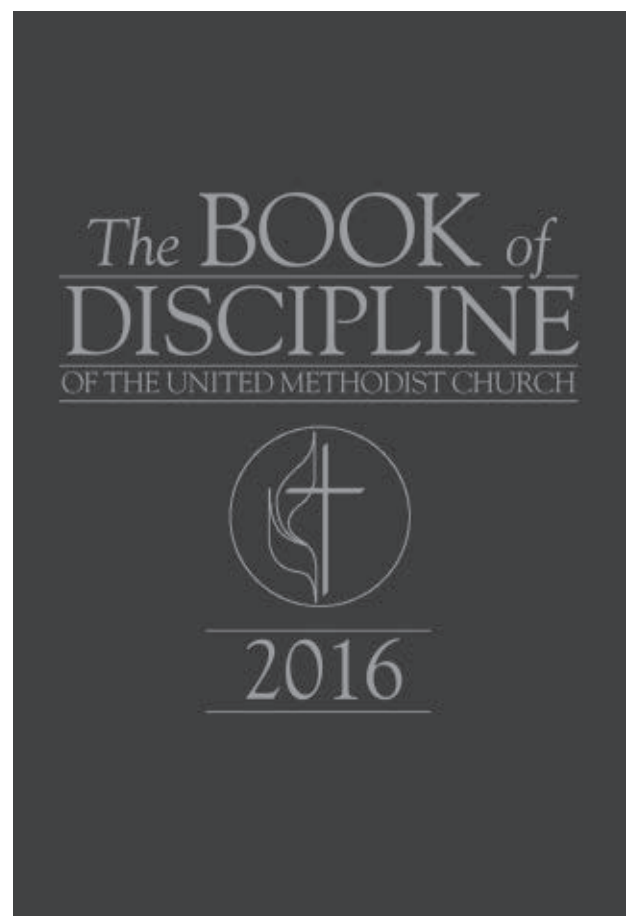


Figure 2. The 'Methodist Discipline', which the church is required to uphold, states: "We find that science's descriptions of cosmological, geological, and biological evolution are not in conflict with theology."

position regarding evolution. One endorses The Clergy Letter Project that provides resources for churches on this subject.”³²

To clarify that he is referring to the same process as non-theistic evolutionists accept, Kuelling added: “Scientists investigating biological evolution have concluded that every living thing in existence today ... shares a common ancestry from long ago. Evolutionary change involves different processes, including natural selection.”³²

“The concept of biological evolution is the fundamental cornerstone—the glue, so to speak—that binds together the biological sciences. Within the scientific community, evolution has long been accepted worldwide. Almost every organization of professional scientists has endorsed the teaching of evolution as an integral part of science education. A 2009 poll of U.S. scientists showed that 97 percent accept evolution over creationism; among life and earth scientists, the percentage is even higher (99.85 percent) Biology has shown, like it or not, that we share common ancestors with them, perhaps as ‘recently’ as 10 million years ago. We are distant cousins of the apes.”³²

He added: “many churches and religious leaders have officially accepted evolution. Regrettably, in many denominations including The United Methodist Church, the news has not reached the entire membership.”³²

The *Clergy Letter Project* was established by atheist Prof. Michael Zimmerman³³ to break down some of the barriers to evolution in the church. This organization

“... has been officially endorsed by The United Methodist Church worldwide! The 2008 General Conference added the following statement to The Book of Resolutions: ‘The United Methodist Church endorses The Clergy Letter Project and its reconciliatory programs between religion and science, and urges United Methodist clergy participation.’ This statement was reaffirmed by the 2016 General Conference. ... [as found in a statement] entitled ‘The Rightful Place of Science In Church’ by Bishop Sally Dyck, Minnesota Annual Conference, United Methodist Church.”³⁴

Atheists especially see the UMC as ‘useful idiots’ for their support and court testimony because atheists in general are fully aware that Darwinism is the doorway to atheism.³⁵ It is for this reason that they frequently publish articles in their publications in favour of Darwinism. By supporting evolution the UMC has planted the seeds of its own demise, as documented by recent surveys. One Pew research poll found over half of all adults under 30 were atheists or agnostic or, at the least, unchurched. According to a 24 August 2016 Pew research poll, a major reason for people being unaffiliated with a church is because of “learning about evolution” in school.³⁶

As penned by one of the most respected writers in America, Yale Ph.D. Tom Wolfe, functional atheist Thomas

Henry Huxley (1825–1895), known as Darwin’s bulldog, created the X Club consisting of a group of nine prominent Darwinists, including Oxford Biology Professor Joseph Hooker, who met every month at a restaurant,

“... and set about—very successfully—stacking influential university science faculties with Darwinists. The X Clubbers had a big hand in creating the pro-Darwinist journal *Nature* (which thrives to this day). They attacked every Darwin doubter the moment he dared raise his voice. That mode of intimidation only intensified over time, leading to what is still known today as ‘the Neo-Darwinist Inquisition’.”³⁷

Furthermore, “Huxley became such an ardent Darwinist not because he believed in Darwin’s theory of natural selection—he never did—but because Darwin was obviously an atheist, just as he [Huxley] was.”³⁷ Thus, the goal of Darwinism from the beginning was a wedge to force theism out of society by social and legal pressure, and replace it with functional atheism.

Beliefs of the laity

Many Methodists have been active in the creation movement and some prominent creationists are Methodists, although the majority of those active in the American creation movement are probably Lutherans and Baptists. One of many examples is Methodist G.W. Pool, who wrote the book *The Origin of Man or Evolution or Revolution, Which?* to support creationism.³⁸ Pool evaluated evolution, focusing on life’s origin and human evolution. The problems of evolution he cites include the fossil record, the difficulty of body organs functioning in between evolutionary states, and the problem of interpreting evidence from limited changes to a gross level, such as apes to humans by natural processes. Pool is primarily oriented towards biological and philosophical concerns, although he alludes to theological issues in most of the chapters.

Nor is the anticreationist worldview reflected in older Methodist literature for lay persons (I was unable to find any newer statements on this topic in their Sunday School Literature). David C. Cook, founded as a Methodist publishing house, puts out weekly Sunday School lessons titled *Sprint*. One issue, appropriately timed to be used at the beginning of the school year, asks: “How did the world begin?”, and answers “The Bible provides the answer to the big questions” such as this.³⁹ The authors of the article proposed several possible answers, including:

1. The universe always was, always will be, and is continually creating itself.
2. Ultimately the universe happened by chance, i.e. the critical elements came together at the right place and time, and with much time and luck, here we are.
3. The Bible’s answer is God created the universe with a specific plan and goal in mind.³⁹

The lesson does not imply the answer is theistic evolution, and is specifically critical of evolution as a whole. It summarizes the basic evolutionary position as follows: “Some evolutionists claim believing that God created the universe doesn’t make scientific sense. The theory of evolution, in its most basic form, says that all living things developed (‘evolved’) from simpler living things. Some even say that life, like the universe, began by chance (the right molecules in the right place at the right time).” The authors concluded “it takes a lot of faith to believe all of that”, writing:

“Scientists have searched for years to find fossil evidence to link one species to another. Genetic changes do occur within each species. But no evidence links one species of life to another. The Bible clearly states what happened at the beginning. The living God created life. He spoke matter into being, then created many different creatures—each after their own kind. We see variety in living beings because God made them that way.”³⁹

They not only point out some of the primary evidence creationists use against evolutionism, but note “lack of evidence casts doubts on evolution’s truth ... at least three scientific principles support belief in creation.” They are: 1) conservation of energy; 2) second law of thermodynamics; and 3) evolution’s mathematical improbability. The authors conclude there exist only two options, namely: “it all happened by chance or by God’s choice. *In the beginning God created*, is not simply a Christian answer to the *big question*. It just might be the *only* reasonable answer.”³⁹

Lesson 20 of this series discusses the conflicts that can occur over this issue in schools.⁴⁰ The author noted: “certain school subjects can also challenge the faith of young teens today. ‘I know my science teacher thinks I’m weird because I don’t believe in evolution’, says Tony. ‘When I told him I believe the world was created, he just gave me a strange look and kept talking. Of course, I have to learn the material and take the tests, but I feel better knowing that I spoke up once.’”⁴⁰

The lesson, written by Elaine McCalla, stresses both *how* and *why* Christian students should speak out about their Christian faith in opposition to Darwinism in their various classes. In the science section, the author states:

“... science easily lends itself to conversations about God. Christian students in biology class have many chances to express their faith. Take the theories of evolution and creation, for example. Christian students can point out the marvelous way things are made and how these [examples] point to a marvelous Maker—as discussed below an organization that does just this was banned. Or, how about a question that is often asked: ‘Is man an animal?’”⁴¹

The ironic fact is many UMC leaders are not cognizant of the beliefs and feelings of, not only their members, but often beliefs expressed in their church publications.

The UMC teacher’s manual for this lesson explains the implications of these student workbook discussions.⁴² It says: “imagine yourself in school ... in your biology or science classroom. It’s the first day of class” when the teacher, Mr Hayes, who has a reputation as a tough but likable teacher, enters the room.⁴² Mr Hayes flips open a huge chart which illustrates marching across the page

“... increasingly complex life forms, beginning with the amoeba and progressing to human beings. You know what’s coming next. ‘Today, class, we’ll get right into our study for the semester: evolution’, says Mr Hayes. ‘We’re going to try to answer this question: Where did it all come from?’ What would be your honest feelings right at this point? Many students will probably express that they experience a sinking feeling. Evolution and the origins of the universe are going to be discussed again from a non-Christian point of view, and they are probably the only Christians in the class. ... One of our common reactions to a situation like this is fear. ... we suspect it’s not reasonable to believe that God created the world. But there are very good logical and Biblical reasons for believing in Creation. Let’s look at some of them.”⁴²

The unit then concludes that the Bible answers questions about where life and the universe come from, and while science struggles with these questions:

“We have a totally creative God How did God create everything? The Bible does not describe the creation process in the same kind of technical terms a scientist might use. However, it’s not unscientific. In answering the question of how God created, science could be helpful—as long as it doesn’t ignore the statements the Bible does make. But just keep in mind one thing. Both the Christian, who says God started it all, and the atheist, who says the world just sort of began, are operating on faith.”⁴²

Another example is the Methodist Holy Baptism for Children, which includes the following words: “In the days of Noah you [God] saved those on the ark through water. After the flood, you set in the clouds a rainbow. When you saw your people as slaves in Egypt, you led them to freedom through the sea. Their children you brought through the Jordan to the land which you promised.”⁴³ Ironically, the church hierarchy has frequently testified in court *against* this conclusion, and those persons who hold these beliefs.

Contrast this to the UMC Bishop of Indiana who wrote: “four major views of creation exist, Biblical creationism, religious rationalism, scientific theism and evolution science”.⁴⁴ He then gave his conclusion that “no effort is made to promote one view as superior to any other”. Nonetheless, not all bishops agreed with this view, especially those that served in the past. Bishop Warren A. Candler (1857–1941) was a Southern Methodist Church bishop who

considered the scriptures inerrant and railed against those who supported biblical criticisms and evolution.⁴⁵

A survey of a typical United Methodist Church

To evaluate the claim that the average Methodist rejects the Darwinian view, in March of 2018, with the permission of the pastor and the elders, I surveyed the members of the local St Paul's United Methodist Church in Montpelier, Ohio, where I am a lay speaker. The survey forms were placed in the bulletin and I explained the purpose of the survey was part of a paper I am writing. The local bishop noted that our church (St Paul's of Montpelier) is a typical solid middle-class Ohio UMC.⁴⁶

Most of the congregants are teachers, and professional people including bankers and business owners. Five congregants are, or were, professors at the local college, and two board members of the college attended St Paul's. The average weekly attendance is close to 124, and a few absent members were given the opinionnaire at the next service. The nearly 100 returned surveys (80% of the total average attendance) was an excellent response. Some did not fill out the one-page form because advanced age made it difficult to read the form, or they did not understand the questions.

The results found 84 of those who completed the form accepted some form of creation, and only 16 accepted theistic evolution. A total of 79 persons accepted biblical creation, 3 supported progressive creation, 2 intelligent design, and not a single person supported choice E, orthodox evolution. Of those who accepted theistic evolution, 6 were college age or younger, 4 young adults (31–50) and 6 over age 50. Of the 79 that accepted biblical creation, 19 (25%) were college age or younger, 10 (13%) age 31–50; 31(39%) age 51–70 and 19 (24%) age 71 and above.

According to my experience speaking in several hundred churches, the results of my survey are typical for many

mainline churches. Last, 50 (63%) of the 79 biblical creationists were above age 51. The number in each category was comparatively small, but the results are what was expected from other surveys. The most significant number is the 83% that accepted some form of creation in contrast to the opposition to this view discussed in the next section.

United Methodist conferences

When the creation issue was brought up at recent conferences, all efforts to deal with the current Darwinism dogmatism were consistently voted down. The conference dealt with doctrine, policy, and other church concerns and has occasionally discussed the creation-evolution issue. For example, efforts at the UMC annual conference in Mobile, Alabama, on 4 June 2013, considered creationism.⁴⁷ Delegates voted down petitions that would have sent requests to the 2016 General Conference regarding creationism and evolution. One petition would have *removed* language stating “evolution is not in conflict with theology”.⁴⁷ Another would have added language supporting the teaching of intelligent design along with evolution in public schools. All were voted down after lively discussion.

Supporters included Rev. Ralph Sigler of The Harvest UMC in Dothan, Alabama, who correctly observed “Christianity is our worldview”, and the Apostles’ Creed, “our most well-known creed”, references the “maker of heaven and Earth”, and parents who want the theory of intelligent design taught to their children may find that “their church stands against them”.⁴⁷

Those who spoke against the petition to support teaching intelligent design included recent high school graduate Trevor Warren who opined that the petition goes against the separation of church and state, adding: “We do not send our children to school to learn about religion. I thought that was the church’s job.”⁴⁷ Senior pastor of First UMC in Pensacola, Florida, Rev. Wesley Wachob, said: “no conflict” exists between science and theology, adding that “creationism is not science but rather ‘bad theology’.”⁴⁷

Obviously, judging by these comments, the critics not only have very little understanding of the controversy, but a great deal of misunderstanding. The fact is, as well documented by an examination of the textbooks used in public school today, theology is widely taught in our public schools, specifically the anti-creation, anti-intelligent design, pro-evolution worldview theology. The view prohibits the wealth of evidence against Darwinism.



Figure 3. A typical United Methodist Church

Banning persons who believe what UMC publications teach

The UMC has since then become even more hostile against any opposition to Darwinism, and church bishops are not innocent in this controversy. In 2016, they were given the title ‘censor of the year’ by the Discovery Institute for banning a group of Christian educators and scientists from displaying scientific literature at the Oregon conference, even though many other groups, including some very controversial ones, were allowed space to present their literature.⁴⁸ The banned scientists were part of the Discovery Institute that produces books and films about the wonders of nature that give testimony to the Creator. The films include topics such as the wonders of bird design, the dolphin’s sonar system, butterfly metamorphosis and design, and even the privileged position our home planet has in the solar system.

Their rejection of these films is ironic in view of the fact that the most common reason people give in surveys for believing in God is the wonders of creation that the films document, and even many theistic evolutionists accept. As Romans 1:20 says: “For ever since the world was created, people have seen ... through everything God made, his invisible qualities—his eternal power and divine nature. So they have no excuse for not knowing God.” This view was also reflected in the 2016 UMC Lent program, which says: “Father Almighty, creator of heaven and earth, you brought all things into being and called them good. From the dust of the earth you formed us into your image and breathed into us the breath of life.”⁴⁹

The specific source of the ban to exclude the Discovery Institute from the church’s General Conference is unclear, but the result was to censor discussion of intelligent design. When the Discovery Institute inquired about the source of the ban, they were told only that Commission ‘leadership’ made the decision. The UMC—although its motto is “Open Hearts, Open Minds, Open Doors”—refused to disclose who made up this shadowy ‘leadership’ group.⁴⁸

Many Methodists have expressed the concern described above by leaving the church. This may be part of the reason why, according to official church data, the US UMC has lost 116,063 members in the last two years alone. This is the equivalent to losing a 318-member local church every day of the year. In 1964, the UMC had over 12 million members; in 2015, 7.2 million, and the average weekly attendance is now only about 2.8 million; less than the Mormons, a church founded only in the late 1800s. As of December, 2015, the once-tiny Mormon Church membership was approaching 19 million. Total wards and branches were 30,016, and full-time missionaries were 74,079. Mormon converts last year alone totalled 257,402.

Why it matters

The concerns outlined above were documented by pollster George Barna, who in 2016 completed an extensive analysis of the spiritual condition in the US by means of a large nationwide polling sample.⁵⁷ The conclusions refer to Protestants and Catholics in general, including:

- “A majority argues that co-habitation, sexual fantasies, sex outside of marriage, giving birth outside of marriage, divorce, doctor-assisted suicide, homosexual relations, and same-sex marriage are now all morally acceptable endeavors.”
- “During the past decade alone there have been huge declines in the proportion of people ... who claim to have made a personal commitment to Jesus Christ.”
- “Belief in God, trust in the Bible, and reliance on Jesus alone for salvation have all declined precipitously. Fewer than one in five adults believes that absolute moral truth exists and is defined in the Bible.”
- “The unchurched population is growing like cancer”
- “The Bible is taking a big hit. ... Only one out of three adults believes it is accurate in all of the principles it teaches.”

Churches that do nothing to stop this slide into a moral crisis and atheism ultimately contribute to it. Just as the Methodist hierarchy in the past has defended or condoned slavery, and even Nazi eugenics, they now indirectly condone sexual behaviour that is detrimental to health and longevity. They also actively oppose those who openly support the main reason people give for their belief in God, namely the evidence and wonders of creation. In contrast, a 1991 survey found 6% of Americans identified their religious affiliation as ‘none’. By the end of the 1990s, 14% of the public claimed no religious affiliation, a number that rose to 20% by 2012. Today, one-quarter (25%) of Americans claim no formal religious identity, making this group the single largest ‘religious group’ in the United States.⁵⁰

Conclusion

The Methodist colleges and the church hierarchy have in general concluded that Darwinism is based on solid settled science and for this reason is consensus science. The response has been to capitulate, and rather than risk a Galileo-like confrontation they have chosen to accommodate this worldview, a compromise termed theistic evolution. They have not only chosen to ignore the overwhelming evidence against the Darwinian worldview, but have supported the opposition to the creation worldview by atheists, agnostics, and others. This review is a good example of the conclusions of biology Prof. Willem Ouweneel who wrote: “biologists are generally more willing to listen to and engage opposing arguments than are theologians. This is because biological generalists are often somewhat aware of the weaknesses in the theory of evolution, whereas theologians are not.”⁵¹

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Examining the usage and scope of historical science—a response to Dr Carol Cleland and a defence of terminology

Paul Price

The important debate over scientific methodology must address the distinction between present and past. One recent idea proposes two realms of science: operational science and historical science. Because historical science addresses hypotheses not open to verification through experimentation, creation scientists have argued that historical science is subordinate to both Scripture and the testable, repeatable results of operational science. Some Darwinists assert that historical science should be considered equal to operational science, such as prominent philosopher of science Dr Carol Cleland. Her arguments will be examined and refuted, while the use of the terminology in question will be explained and defended.

Operational science deals with matters which are susceptible to investigation directly using the scientific method. This method, credited originally to creationist Francis Bacon, involves developing a hypothesis, conducting an experiment to test the hypothesis, and then determining if the result can be repeated in future experiments. This of course depends on our ability to actually witness the phenomenon in question.

On the other hand, historical science deals with investigating clues to determine what events have occurred in the past. Because we lack the ability to directly witness these events and conduct experiments on them, the scientific method does not apply here. Instead, clues are examined and a story is created that seems to plausibly explain the clues we find. This is forensics—exactly the same process used in crime scene investigations. But the fundamental difference here is that we cannot actually observe, test, or repeat past events. This weakness means we must always hold historical science loosely; it is always possible that new clues may come to light that totally change our appraisal. Our conscious and subconscious biases will also sway us in one direction or another as we seek to explain what we find. This is doubly true when we are dealing with questions of ultimate origins—questions having far-reaching and even spiritual ramifications.

On the usage of terms

In the modern intellectual landscape, the above concepts have unfortunately been muddled, and in many cases outright denied. Creationist authors Reed and Klevberg trace the first

usage of the term ‘operation science’ back to the writings of Norman Geisler from the 1980s,¹ a conclusion with which creationist writer Troy Lacey also agrees.² However, Reed and Klevberg incorrectly assume that this basic binary differentiation of terms between past and present is a later creationist corruption of the fourfold distinction proposed by Geisler and Anderson (they abbreviate it OS²)³—in reality instances of this basic binary distinction, even in secular literature, can be traced back at least as far as the 1930s.²

While there is no problem with Reed and Klevberg’s proposal of considering history and science separate fields entirely, with things like historical science being regarded as ‘mixed questions’,⁴ there is no meaningful distinction between this proposal and using the term ‘historical science’, which implies based upon the name that it is indeed a ‘mixed question’ between the fields of history and science.

They may be reading a bit too much into this terminology when they assert it represents a concession to the philosophy of positivism—certainly none of the creationists using the term would want to make any such concession! It seems, if nothing else, a convenient term for the explanation of these concepts to general audiences, without getting into the greater subtleties of Geisler’s OS² or the philosophically driven semantics of Reed and Klevberg. As this binary scheme now has several decades worth of usage behind it, it is this author’s opinion that making a fundamental change here would be more problematic than it would be worth to the creationist community at large.

One could, for example, launch a similar campaign against the usage of the term ‘natural selection’ (and some have done so!) on the grounds that the term implicitly commits

the fallacy of reification and wrongly implies that nature acts as an agent to ‘select’ things. However, by and large the creationist community continues to use this term for simple ease of communication.

Muddying the waters

Even those who do accept this distinction in the secular community will often deny that historical science is untestable; instead claiming that the two types of science are co-equal in terms of their ability to be verified. The motive here could not be clearer, for these individuals would have us believe that to deny Darwinism is no less anti-scientific than to deny operational physics or chemistry. They want to leave no room for discussion or debate on origins science.

For example, renowned evolutionist Dr Ernst Mayr once said in a lecture:

“For example, Darwin introduced historicity into science. Evolutionary biology, in contrast with physics and chemistry, is a historical science—the evolutionist attempts to explain events and processes that have already taken place. Laws and experiments are inappropriate techniques for the explication of such events and processes. Instead one constructs a historical narrative, consisting of a tentative reconstruction of the particular scenario that led to the events one is trying to explain.”⁵

This is a straightforward appraisal that no creation scientist would likely take issue with. But Mayr continues shortly afterward in the same address:

“The testing of historical narratives implies that the wide gap between science and the humanities that so troubled physicist C.P. Snow is actually nonexistent—by virtue of its methodology and its acceptance of the time factor that makes change possible, evolutionary biology serves as a bridge.”⁵

So, while Mayr clearly understood the distinction between operational and historical science, he deliberately muddled that distinction in the same breath by claiming that we can ‘test’ historical narratives, and that therefore there is no gap between these two methodologies.

Another such individual is Dr Carol Cleland, a Professor of Philosophy and Director of the Center for the Study of Origins at the University of Colorado, Boulder (figure 1). Like Mayr, Cleland also clearly recognizes this binary distinction:

“Historiographic [historical] science differs in important ways from experimental [operational] science. The hypotheses of experimental science typically postulate regularities among kinds or types of events ... In contrast, the hypotheses of scientific historiography typically postulate particular events ...”⁶

And also like Mayr, Cleland wishes to dispute the idea that historical science is less trustworthy and reliable than experimental science. In 2001, Cleland had a paper published in the journal *Geology* entitled ‘Historical science, experimental science, and the scientific method’.⁷ After mentioning that experimental scientists sometimes denigrate the ‘just-so stories’ given in historical science, she makes the following rather candid and surprising admission:

“The startling number of physicists and chemists who attack the scientific status of neo-Darwinian evolution provides telling examples of this phenomenon.”⁸

The reason I say this admission is both candid and surprising is that it is overwhelmingly common for Darwinists to employ the intimidation tactic of claiming that no ‘real scientists’ question the validity of evolution (employing a ‘No True Scotsman’ fallacy in the process). But here we see that they do, albeit apparently in private.

Cleland spends some time setting the stage for this debate by explaining the history of the scientific method, as well as the limitations imposed on experimental science by the



Figure 1. Dr Carol Cleland, philosopher of science

problem of induction: no finite number of examples can ever conclusively prove a universal generalization. It is for this reason that ‘falsificationism’ has been generally embraced by the experimental scientific community, following the work of Karl Popper, who utilized the logical principle of *Modus Tollens*, or denying the consequent: “If P, then Q. Not Q. Therefore, not P.” Using sequent notation:

$$P \rightarrow Q, \neg Q \vdash \neg P$$

In other words, a universal generalization is false if one can find at least one genuine example where it does not apply.⁸ Using this methodology, we never seek to *confirm* a hypothesis; instead we seek to prove it wrong by finding an example where it fails. If no one can produce any such example, it is held to be plausibly correct, and the more times it has been tested, the greater the degree of confidence becomes. Proponents of this methodology of science sometimes go so far as to proclaim that anything failing to apply it is not science at all—Dr Cleland quotes Henry Gee, an editor of *Nature*, as saying, “[Historical hypotheses] can never be tested by experiment, and so they are unscientific No science can ever be historical.”⁹

Cleland’s rebuttal to falsificationism

Interestingly, Cleland chooses in her response not to prop up historical science, but to attempt to chop down empirical science, bringing them both down to the same level. As Reed and Klevberg note:

“Cleland raises an immediate red flag in her decision to critique experimental science. Why not simply present a positive case for historical science? It seems uncomfortably like an emotive appeal to those victimized by the unbridled arrogance of secular scientists.”¹⁰

Cleland’s response to falsificationism is to claim it is ‘deeply flawed’, citing two lines of reasoning: 1) real-world experiments involve a variety of auxiliary assumptions such that a failed repetition need not signify a falsified hypothesis, and 2) scientists do not routinely practise falsificationism when dealing with their own hypotheses.¹¹ While it is worthwhile to address both of these claims in more depth, it bears noting right away that neither of these statements, even if they are fully accurate, entail that historical science is trustworthy! This appears to be a fatal blow at the outset for Cleland’s attempted defence of historical science.

In response to the first point we potentially agree: it is difficult to isolate all the variables involved in real-world experimentation, and as such, science as a means of arriving at ‘truth’ will always be a ‘leaky bucket’. This is exactly why we need Scripture to give us a ground from which to conduct

our science! And to the second: what relevance does it have to point out that most scientists routinely act hypocritically by failing to live up to their own stated standards? How does that in any way invalidate the standards themselves?

Controlling for confounding variables

Cleland writes:

“The falsity of an auxiliary assumption (versus the target hypothesis) could be responsible for a failed prediction. Every science student is implicitly aware of this because repetitions of classical experiments in laboratory exercises often go wrong not because the hypothesis being tested is false, but because, for example, equipment malfunctions or the sample is contaminated. Moreover, this difficulty *cannot be circumvented* by varying the conditions under which a hypothesis is tested, given that the number of auxiliary conditions involved in any real-world situation is unknown and potentially infinite; it is impossible to control for them all. The famous Popperian directive to bite the bullet and reject the hypothesis in the face of a failed prediction has no logical force [emphasis added].”¹¹

Now on the one hand, there are many methods for controlling for confounding variables or auxiliary assumptions in experimental design, and also for separating them out after the fact using statistical analysis.¹²

On the other hand, however, it may well be true that in the real world of scientific testing, it is simply impossible to separate all the variables from the one being tested. Cleland alludes to this:

“Karl Popper’s highly influential alternative to inductivism, falsificationism, was undermined by the discovery that theoretical and background assumptions play integral roles in the rejection of hypotheses (the Quine-Duhem thesis), as well as in their acceptance (Gooding 2001).”⁶

In other words, your interpretations are guided by your interpretive filter (your worldview or starting assumptions). This is what we in the creationist community have been striving to point out. This means that, absent a foundation in Scripture to guide us in our basic worldview, it becomes hard to justify drawing *any* solid conclusions from science, even in the present. It is always possible there could be some unknown confounding variable we had failed to account for in our experiments. This problem is greatly reduced if we start from Scripture as the revealed word of God and move out from there, using falsifiable predictions to attempt to fill in gaps of knowledge that we cannot obtain from Scripture alone.

The real-world practice of falsificationism (or lack thereof)

As mentioned above, Cleland's second objection to falsificationism is that it is often not practised in the real world of science. She writes:

"Furthermore, as Kuhn (1970) pointed out, scientists almost never practice falsificationism. In the face of a failed prediction, they mount a sustained search for conditions other than C that might be responsible. This amounts to exercising the logically permissible option of salvaging a hypothesis by rejecting an auxiliary assumption."¹¹

As an example, she cites the incident of nineteenth century astronomers discovering the planet Neptune after finding that the orbit of the planet Uranus failed to conform to the predictions of Newtonian physics. Rather than rejecting Newtonian physics altogether, as Cleland states they *should have done* in accordance with falsificationism, they stuck with Newtonian physics and searched for a confounding factor. It turned out that factor was a new planet! But wait: would anyone really object to this, even under strict falsificationism? It seems that Cleland has set up a strawman by implying that falsificationism, in principle, does not allow for the presence of confounding variables in experiments. Apparently, Cleland would have us believe that the only correct response to a failed prediction, *on falsificationism*, is to utterly reject the hypothesis, admitting no room for the pitfalls of experimental methodology in the real world. This is clearly a strawman because it does not fairly represent Popper's ideas:

"Popper has always drawn a clear distinction between the logic of falsifiability and its applied methodology. The logic of his theory is utterly simple: if a single ferrous metal is unaffected by a magnetic field it cannot be the case that all ferrous metals are affected by magnetic fields. Logically speaking, a scientific law is conclusively falsifiable although it is not conclusively verifiable. Methodologically, however, the situation is much more complex: no observation is free from the possibility of error—consequently we may question whether our experimental result was what it appeared to be.

Thus, while advocating falsifiability as the criterion of demarcation for science, Popper explicitly allows for the fact that in practice a single conflicting or counter-instance is never sufficient methodologically to falsify a theory, and that scientific theories are often retained even though much of the available evidence conflicts with them, or is anomalous with respect to them."¹³

But what about the cases where scientists really do fail to apply falsificationism in practice? One need look no further than the example of Pasteur's refutation of

spontaneous generation a.k.a. abiogenesis. In spite of the fact that abiogenesis has been repeatedly falsified experimentally (though technically one can never prove a universal negative, so the term must be employed loosely here), the mainstream scientific community continues to cling to a belief that life began spontaneously from non-living matter—a belief that Dr Cleland would seem to also share.¹⁴ Since there is no scientific basis for this belief, we would be right to refer to their belief in abiogenesis as *blind faith*.

In any case, Dr Cleland is obviously right that scientists do not consistently apply falsificationism in real-world practice; but this says nothing of the usefulness of the methodology. It shows that scientists are human beings with worldviews and pet theories they seek to protect—even when it conflicts with known scientific results.

A 'smoking gun'?

The alternative Cleland seems to propose to falsificationism is the search for a so-called smoking gun:

"A look at the actual practices of historical researchers, however, reveals that the main emphasis is on finding positive evidence—a smoking gun. A smoking gun is a trace that picks out one of the competing hypotheses as providing a better causal explanation for the currently available traces than the others."¹¹

There is a major problem with this methodology that goes completely unaddressed: what counts as a 'smoking gun' in the minds of scientists is ultimately arbitrary, being dependent upon the types of causes they are able to conceive of at the time. Not only that, but the scope of competing hypotheses researchers are willing to consider is subjective; it is known all too well by members of the creation science community that unfavoured explanations (such as biblical creation, for example!) are ostracized and refused consideration by the secular mainstream scientific community. As geneticist Richard Lewontin famously put it, they don't want to "allow a Divine Foot in the door".¹⁵ In other words, the 'smokiness of the gun' is in the eye of the beholder. This does absolutely nothing to remove the subjective element from historical science.

To take one of Cleland's examples as a case in point:

"Prior to 1980 there were many different explanations for the demise of the dinosaurs, including disease, climate change, volcanism, and meteorite impact. The discovery of extensive deposits of iridium in the K-T boundary focused attention on the impact of a meteor; iridium is rare at Earth's surface, but high concentrations exist in Earth's interior and in meteors. The subsequent discovery of shocked quartz in the K-T boundary cinched [*sic*] the case for the impact of a

large meteorite, because there was no known volcanic mechanism for producing that much shocked quartz.”¹¹

If the discovery of shocked quartz in the K-T boundary is to be regarded as a smoking gun piece of evidence that decides the case in favour of the meteorite-impact hypothesis (figure 2), then we should at a bare minimum expect that today, there is nearly universal consensus on this topic among mainstream scientists. This is not the case. In fact, it does not take much searching to come up with the following statement from a mainstream source (*National Geographic*):

“The cause of the mass extinction that marks the end of the Cretaceous and the beginning of the Paleogene is a scientific mystery.”¹⁶

So, if this event is still being regarded as a mystery up to the present day, how can Cleland claim that any particular piece of evidence was a smoking gun? This is of course all an in-house debate among scientists that accept deep time and Darwinian evolution. If one jettisons the assumption of millions of years, and understands that the fossil record is largely not a record of gradual change but of global catastrophe over the span of around one year, then the discovery of evidence of meteorite impacts in the fossil record has no bearing any longer on the question of how the dinosaurs died out.

We have evidence from artefacts that strongly suggests humans and dinosaurs have coexisted in the past.¹⁷ Why is this not considered a smoking gun by evolutionists, falsifying the entire notion that dinosaurs died out millions of years ago? Simply put, it is because they refuse to consider this evidence, because to do so would force them to reconsider their worldview. This serves to underscore the point: evidence is always filtered through the starting assumptions of our worldview—it doesn’t speak for itself.¹⁸



Figure 2. Cleland believes that ‘smoking gun’ evidence has been found for the hypothesis that a major asteroid impact caused the extinction of the dinosaurs.

The asymmetry of overdetermination

Cleland appeals to the ‘asymmetry of overdetermination’ to explain the methodological differences between historical and operational science:

“Localized events tend to be causally connected in time in an asymmetric manner. As an example, the eruption of a volcano has many different effects (e.g. ash, pumice, masses of basalt, clouds of gases), but only a small fraction of this material is required in order to infer that it occurred; put dramatically, one doesn’t need every minute particle of ash. Indeed, any one of an enormous number of remarkably small subcollections of these effects will do. Running things in the other direction of time, however, produces strikingly different results. Predicting the occurrence of an eruption is much more difficult than inferring that one has already occurred ... The asymmetry of overdetermination explains the reputedly problematic differences between historical and experimental science *vis-a-vis* the testing of hypotheses. Just as there are many different possibilities (subcollections of traces) for catching criminals, so there are many different possibilities for establishing what caused the extinction of the dinosaurs ... [Scientists] postulate differing causal etiologies for the traces they observe, and then try to discriminate from among them by searching for a smoking gun—a trace that will identify the culprit beyond a reasonable doubt.”¹⁹

There is little doubt that the asymmetry of overdetermination is a valid observation about the facts of reality available to us as human beings, limited by the factor of time and what we are able to observe and understand. It is indeed harder to predict future events than it is to infer past events—just as it is harder to say exactly when and where a storm will occur in the future than it is to infer one has just passed by looking at clues such as the ground being wet and covered with hailstones.

However, what Cleland fails to consider is that our inferences about past events are all based upon our experiences; we see phenomena occur, and we witness the clues they leave behind. When coming across those same clues again in the future, we will tend to infer the same causes that we observed causing those clues the last time. We see storms happen, and we witness them producing hailstones. This is actually empirical and observational. But this also serves to highlight the central weakness of all historical science: we are limited in our explanations to the types of causes with which we are already familiar from our own experience. We are inherently unable to infer causes that we have never witnessed ourselves. Looking into the past, this puts us at a disadvantage: we will always tend to try to shoehorn the available evidence into fitting with

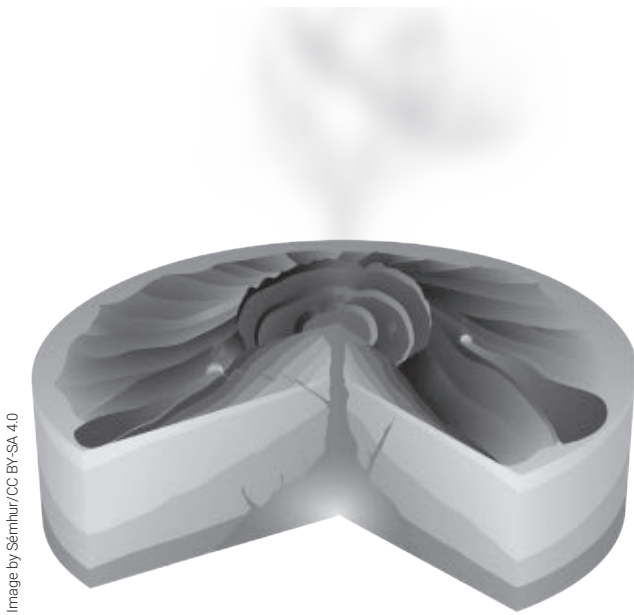


Figure 3. The ‘asymmetry of overdetermination’ can be illustrated by the fact that it is easier to infer the past eruption of a volcano (based on any of a great number of possible clues) than it is to predict its future eruption. Cleland claims this fact fully accounts for the differences in methodology between historical and operational science.

known types of phenomena as potential causes. It is exactly this tendency that perhaps led us to the widespread practice of uniformitarianism in mainstream historical science: the maxim that *the present is the key to the past* is really our only option for attempting to decipher history if we have rejected the inspired testimony of Scripture!

There is nothing logical or scientific about assuming that no unique causes have acted in the past which we do not observe in the present day. It is entirely conceivable that such is the case, and Scripture testifies that it really is the case. The Great Flood was unlike anything that anyone has ever witnessed, before or since. The only way to know what happened in the past for sure is to have a reliable eyewitness report from those who were there. Ironically, Cleland writes in a response to criticism:

“... when it comes to accruing evidence for a hypothesis, scientists do not have a God’s-eye perspective from outside of time. They are irrevocably situated in the flow of time, and the evidential position of the historian is fundamentally different from that of the experimentalist.”²⁰

Exactly! But with Scripture, a God’s-eye perspective is available to us! This is a perspective that Cleland ignores without so much as a mention. Cleland’s admission that the evidential position of historians is ‘fundamentally different’ from experimentalists serves to undercut her primary thesis that, ‘historical science is not inferior to classical experimental science’.⁸ Saying one is not inferior to the other is just like

saying that it is no better to *witness a crime as it happens* than it is to attempt to piece together what happened after the fact using the available clues. What forensic investigator would agree to such a statement?

In yet another piece of very rich irony, Cleland also says the following:

“... it is much easier to find a smoking gun for unusual catastrophic historical events having global consequences than for complex, ordinary historical processes and events having local consequences because the former, but not the latter, will typically leave traces ... that stand out in the stratigraphic record as noteworthy.”²¹

Hey, how about the presence of the whole stratigraphic record itself? Could that be a ‘smoking gun’ that there was a global flood? What about the fact that we find millions of fossils all over the planet, many showing evidence of rapid burial and submersion in water? What about finding marine fossils on the highest mountain peaks? The secular community manages to overlook all these things in order to maintain their belief in gradualism and the denial of the global flood. The ‘smoking gun’ is there, but people refuse to see it because they are willingly ignorant (as predicted in 2 Peter 3).

Conclusion

Dr Cleland has attempted to rescue historical science from the criticisms of those in the scientific community who recognize the superiority of empirical (operational) science to unfalsifiable stories about the past. Unfortunately, her attempts all end in failure because they all ultimately boil down to an attack on empirical, observational science, rather than a demonstration of the reliability of historical science.

In Cleland’s own words:

“The findings of historical science are just as tentative and subject to revision as those of experimental science Ideally, this process converges upon a single hypothesis. But there are no guarantees ... it is important to keep in mind that the correct hypothesis may not be among those being entertained and indeed may never be entertained by humans; historical scientists are just as limited by their imaginations as experimentalists.

Moreover, even supposing that the correct explanation is among those under consideration, there are no guarantees that a smoking gun for it will be found even supposing that one exists.”²²

Cleland may be praised here for her honesty, but this worldview is bleak and hopeless. We can never be sure of knowing anything if we are dependent on human science alone, and Cleland appears to embrace this skeptical, agnostic attitude, but only up to a point; she is never skeptical of the overall

secular dogma concerning the past: millions of years and evolution are *always* taken for granted in Cleland's writings.

Just like most other secular scientists, Cleland does not consider the weight of divine Scripture as a guide to what has occurred in earth's past, as well as a foundation from which we can draw conclusions about the present regular workings of the universe. Neither experimental nor historical science are of much value without Scripture, and Cleland is almost hilariously blind to her own anti-creationist biases even while going out of her way to point out how much biases really do influence the conclusions of scientists.

For example, Cleland in multiple publications devotes much time to the asteroid-impact theory of dinosaur extinction, but never once does she consider the possibility that the dinosaurs died out relatively recently, despite the presence of soft tissue in dinosaur bones (another 'smoking gun' that neo-Darwinists like Cleland must intentionally overlook).²³ This simultaneously shows Cleland is right about the power of biases to control scientific conclusions, yet wrong about the conclusions she herself draws.

Falsifiability remains as a powerful demarcation between operational and historical science (despite the practical limitations scientists often face), and Cleland's attack on the methodology of falsification was based upon a mischaracterization. Because we are highly limited in the amount of evidence we are practically able to collect about the past, as well as in our ability to conceive of all possible causes of a given piece of evidence, eyewitness testimony will always be preferable to speculative reconstructions.

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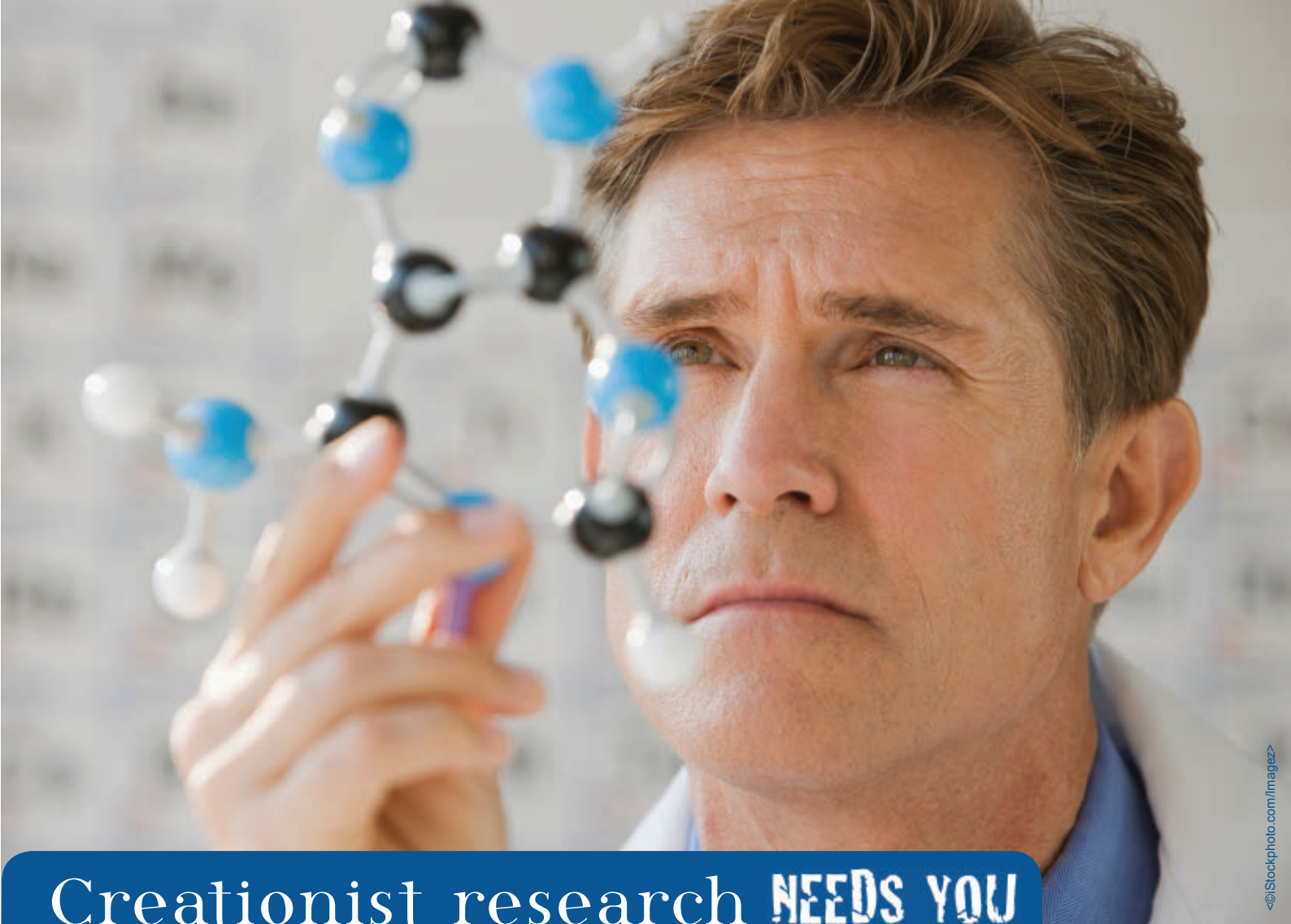
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